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// TOWARDS A BETTER PRODUCTION OF SUGAR CANE BY OUTGROWER
FARMERS OF WEBUYE DIVISION, BUNGOMA DISTRICT. //

BY

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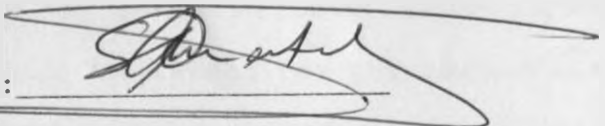
DECLARATION

THIS THESIS IS MY ORIGINAL WORK AND HAS NOT BEEN
PRESENTED FOR A DEGREE IN ANY OTHER UNIVERSITY.

SIGNED: H. Wafula

HELLEN WAFULA,
CANDIDATE.

THIS THESIS HAS BEEN SUBMITTED FOR EXAMINATION WITH MY
APPROVAL AS A UNIVERSITY SUPERVISOR.

SIGNED: 

DR. S. AKATCH.
SUPERVISOR.

JUNE 1993.

(III)

DEDICATION

To my beloved family, Alexander Kamwele, and daughter Naom Mumbua Maithya.

(IV)

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Although the success of this study depended on

many people, I alone remain responsible for any errors or misconceptions contained in this work are entirely mine.

Hellen Wafula.

ABSTRACT

Agriculture is the mainstay of Kenya's economy. The general agricultural policy has been guided by an overall strategy of meeting the objective of trying to maintain a position of broad self-sufficiency in foodstuffs and provision of raw materials for the agro-based industries. It is on this basis that this study was undertaken to try and find out how efficient provision of raw materials for the Nzoia Sugar factory by the small-holders is.

The study deals with the role that outgrowers play in the provision of sugarcane to the Nzoia Sugar Company and the constraints that hinder better of sugarcane in Webuye Division, Bungoma District. Recommendations that would try to solve the identified constraints to sugarcane production are given in Chapter Five of the study.

The study found out that the government policy has favoured the development of small-scale agriculture because of the role it plays when well developed. This was revealed from the field findings whereby the production of sugarcane process was found to be labour intensive and therefore offers more

employment per unit of hectare grown. This meant increasing incomes to majority of the small-holders who would in turn use their earnings for improving their standards of living. But the stated policies are however not reflected in the governments action in certain areas which would support small-holder agricultural. This included the provision of credit facilities, extension services, and research. Further constraints were identified as low incomes of the farmers, poor transportation facilities, delays in harvesting and payments, poor management at the factory level, and poor distribution of inputs.

The study recommended that if better production of sugarcane was to be attained so as to improve the sugar yields, the above constraints have to be solved. There is need for a concerted effort by extension officers, credit agencies and the research institutions to come in and help the small-holders to improve their production levels. Practical policy need to be reoriented to favour small-holders in credit provision, access to extension services and research. This therefore calls for the intensification of public

participation in planning. To improve incomes, there is need for the diversification of crops and adoption of off-farm activities by the farmers. These recommendations if adopted will hopefully go a long way in leading to a better production of sugarcane in Webuye Division.

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CHAPTER ONE : INTRODUCTION

1.1 General Introduction

Agriculture is the mainstay of Kenya's economy. It supports about 80% of the population and contributes about 30% of the GDP (Development Plan 1979-83). Therefore its improvement as stipulated in the above referenced Development Plan will meet welfare objectives which could act as an investment in the national economy.

The overall thrust of Agricultural policy is therefore to achieve internal food self-sufficiency, maintain adequate levels of strategic reserves, and to generate additional surplus for export. It has other policies on for example, the agricultural price policy, agricultural inputs policy, research and extension policy, food security policy, nutritional policy, and employment policy, etc.

If Agriculture is well planned and developed, it can play many roles including: provision of increased food supply to the increasing population, provision of additional foreign exchange earnings for import of essential capital goods for further investments, increasing rural incomes by providing employment opportunities which can be mobilized by the government, improving welfare of the rural population, and providing increased raw materials for the agro-

The scenario in Kenya shows an imbalance between the urban areas and the rural areas. Most industries are located in urban areas with a big proportion in Nairobi, Thika, Mombasa, Nakuru, and Eldoret. To try and reduce the imbalance, the government came up with a policy to aid it. This was the policy of dispersion of industrial activity from urban areas to rural areas. This move would initiate the growth and development of rural areas by creating more employment opportunities, cutting down on the rural urban migration with its implications, and to improve standards of living of the rural population.

In line with the government policy, Nzoia Sugar Factory was set up in 1975, in Bungoma District, Kanduyi Division of Western Province. This is an example of an agro-based industry which was found suitable for the rural areas. The industry was set up with the aims of creating employment for the rural population, raising standards of living by creating additional income through growing sugarcane, and to help in making the country self-sufficient in sugar production. This would help in saving the already meagre foreign exchange currency, that would have otherwise been used in importing the commodity. The policy further aimed at improving generally the rural

areas by introducing cash crops.

In the process, social facilities like health, education, housing, recreation, water and sanitation, commercial activities, electricity, telephones and physical infrastructural facilities would be developed. The infrastructural facilities would support and hence facilitate the proper working of the factory activities.

In fact, industries are attracted to areas which have basic technical infrastructure, labour force and raw materials. But the provision of raw materials necessitated the involvement of small scale farmers to grow and provide sugarcane for the factory. They were to supplement the nucleus estates supply. But the farmer had to enter into contract with the company, whereby the farmer undertook to clear the land of all vegetation and to take care of the cane once its grown.

The contractual obligations of the company were to plough the land for the farmers, provide seed cane, fertilizers, and supervise the planting, offer extension services, and to transport the crop for the farmers to the factory.

1.2 Statement of the Problem

From the contractual obligations between the company and the farmers, since the start up of the factory the experience of the outgrower farmers has not been pleasing, it has tended to be contrary to what was stipulated in the contract.

The relationship between the farmers and the company has not been smooth going as per contract. This has affected the scale of benefits which outgrower farmers and the company get from the production of sugarcane.

Whereas the area under cane has been increasing, yields per hectare have been falling. This has been due to improper crop husbandry, failure of company to honour the terms of the contract, thus fertilizers are either not provided, or when provided, its inadequate and delayed in delivery. Some seedcanes are not up to standard, or in other words, the provision is inadequate, inefficient, with corrupt labourers and field staff.

There have been certain constraints, on the part of the farmer to efficiently grow the cane, including lack of readily available labour, capital and physical constraints.

Another factor noticed in the area that has tended to affect the yields are the poorly maintained roads. This cause delays and wastage of sugar tonnage during transportation to the factory for milling.

Some problems of carelessness and mismanagement on the part of the farmers are also eminent. Given inputs are misused, and some are reluctant to adopt services offered by the extension staff. In some areas, farmers are never visited by the extension workers at all.

The final payments after cane delivery, take too long to reach the farmers. This reduces the morale of farmers to produce more cane. This further affects re-investments, living standards and rural development as a whole is affected too. This is because most farmers over-rely on cane at the expense of other food crops.

1.3 Objectives of the study

Having identified the above problems, the following objectives were set;

1. To assess the role of the outgrower farmer in the production of sugarcane. This would deal with acreage of land under cane, amount of cane harvested, actual totals of sugar production as compared to the

nucleus estates of the factory.

2. To identify problems (constraints) involved in the various stages of sugarcane production. This is from land preparation, weeding, harvesting, transport etc. Possible causes of these problems will also be identified.

3. To suggest possible policy measures for improving the production of sugarcane by outgrower farmers.

1.4 Hypothesis

Given the above objectives the following hypothesis were set;

1. There is a significant difference^e between outgrowers and nucleus estates in the production of sugarcane in terms of the proportion of land under cane, area of cane harvested (MT) and yields (TC/HA).
2. Sugarcane production is affected by the poor relationship between the outgrower farmers and the company management.

1.5 Methodology

Secondary and primary sources of data collection were used. Secondary data was collected from both published and unpublished materials from libraries and

from institutions like Kenya Sugar Authority and Ministry of Lands and Housing.

A reconnaissance trip was made to familiarize the researcher and research assistants with the study area.

Primary data was collected by use of questionnaires administered to households which were growing sugar cane. In Webuye Division, there were 792 outgrower farmers in the sublocations studied. A total number of 80 questionnaires were administered. This constituted around 10% of the total households growing sugarcane. This was done randomly using the simple random method of data collection. The administering was done randomly using the lines of communication for easier movement. Formal interviews were made with the Nzoia Sugar factory management. This included the Agricultural manager and Outgrower departments' officer.

Personal observations of the sugar fields, roads, and general development were made.

1.6 Data Analysis

In line with the set objectives, analysis was done using descriptive and inferential statistical techniques. Frequencies played a major part in the

analysis of proportions of respondents in number and percentages.

Bar charts, tables of frequencies and line graphs were used to show comparisons between outgrowers and nucleus estates and the trend of production yields.

1.7 Scope of study

The study is limited to Webuye Division, Bungoma District of Western Province. The focus of the study is on the outgrower farmers, outlining their role and problems encountered in the production process of sugarcane.

Socio-economic aspects of the farmers are looked into, and their effects on sugarcane production eg. income levels, family size, farm sizes, consumption habits, and land use systems etc. The problems encountered by the outgrower farmers in trying to fulfil the terms of the contract with the management are also evaluated. Possible measures to try and rectify the identified problems are finally looked into to conclude the study. These are done in line with the set objectives of the study.

1.8 Justification of study

The role that agro-based industries play in the economy and the need to improve the agricultural practices so as to attain the various policy implications of generating employment, improving standards of living, and per capita incomes, attaining self sufficiency in food production and produce surplus for export to earn foreign exchange called for the need of study. The improved incomes would further encourage savings and investments meaning improved development of rural areas.

Farmers, in their process of providing raw materials for the sugar industry, encounter hindrances to efficient production. This then justifies the need of the study. The study tries to find out the real constraints that farmers encounter, the sources of the constraints and how best to solve them. This is to meet the needs of the ever increasing population, of employment, sugar etc.

The constraints faced in the production of sugarcane seem obvious but they are not always readily available. This study will hopefully enable governments to formulate effective policies for rural areas and to improve areas of inadequacy in the existing policies. This study therefore expects to

contribute significantly to that gap in the information, and therefore enhance the process of policy making.

Furthermore, experience of the farmer-company relationship is rarely documented. The planning agency assume things are working smoothly, when infact the target population (farmer) is suffering. Hence the researcher undertook the study to establish the specific problems encountered.

This approach, from the planners view, tries to pin point where in planning process, attempts can be made to increase better utilization of land and supporting inputs. This is different from the Agronomist view of how increased farm yields can be attained.

1.9 Study Limitations

The study has limitations which are attributed to data collection from study area.

The area to be covered was too large to be fully studied within the specified time period. This resulted in sampling the Division interms of Sub-locations that were growing sugarcane.

The scope of the study was another limitation. The study is limited to only planning aspects which is

an area of specialisation. The technical aspects of production were not looked into.

Finance was a limiting factor. This is because recruitment of enough research assistants, travelling costs and personal upkeep in the field proved to be much higher than the money advanced for research.

Time was too short to enable effective data collection because this type of study required a longer duration.

There was unwillingness of respondents to release information on for instance, income levels, size of land, etc. This proved difficult to get the exact information due to suspicion. But attempts to counter check the information on incomes was done by use of expenditure patterns of the farmers.

1.10 Organization of Thesis

The Thesis has five chapters. Chapter One has given an introduction which covers the role of Agriculture and Agro-based industries in the countrys' economy. The Chapter further consists of the problem statement, study objectives, hypothesis, scope and justification of the study, study methodology, and limitations.

Chapter Two gives an account of the Literature

Review and the Theoretical Framework of the study. Chapter Three gives an account of the study area including its physical and socio-economic characteristics. This encompasses the population, landuse patterns, and employment levels. The same chapter considers the Kenyan government policy on Agriculture as a whole and the small scale agriculture in particular. The Chapter discusses in particular, the various policy issues such as credit, extension services, and research. The Chapter ends with a brief account of the Historical Development of the sugar industry in Kenya, including the Organisations of the outgrowers to serve their interests.

Chapter Four discusses the report of field survey and analysis. Chapter Five gives a summary of field findings and proposals to the constraints encountered by outgrowers during production process. The Chapter ends with a conclusion both on policy and programmes which could be used to help improve small-holder agriculture.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Literature Review

This chapter presents a brief but relevant review of literature pertinent to the study objectives. The focus being the role of the farmer in sugarcane production and of the sugar industry as a whole in rural development. This will include the provision of sugarcane as a raw material for sugar production, employment generation, and other related trickle down effects emanating from earning incomes from sugar cane growing. But efficient sugar cane production is faced by constraints which have greatly affected its output. Thus the literature will further try to review the effects of factors like land, labour, capital, and availability of skills. The use of farming inputs like fertilizers, extension services and credit facilities will also be evident in the literature.

The role therefore of agrobased industries and agriculture in rural development has attracted the attention of many scholars. This is explained by the fact that majority of the population reside in rural areas of which 70% are small scale farmers. These farmers provide 90% of rural population employment,

therefore this calls for better utilization of land and supporting inputs so as to increase and improve farm production.

2.1.1 Role of Sugar Industry in Economic Development.

Mwandihi (1988) and Sabatia (1992) noted that sugar industry is one of the agricultural activities traditionally looked at in Kenya as being capable of providing gainful employment to the country's fast growing population. They noted that the largest secondary effect on employment, resulting from the setting up a sugar industry, is through the backward linkages to the suppliers of sugarcane. The main raw material inputs of which must be supplied locally by small scale farmers and large farms because it is bulky and highly perishable.

Gyllsteum (1977) in his study of production organisation, argues that the emergence of spatial structure is also dependent on the organisation of the production, and on how the supporting bodies are built-up and finally on how efficient they perform their functions. He noted that by linking the small-holder to the type of organisation which is able to undertake the necessary large-scale operations research, there is bound to be a more balanced spatial

spread of employment skills and income. He found out that small-holder production of tea is superior to estates in contributing to regional economic development. This is because agro-based establishments subordinated to large operations are up to foster skewed resource use and intra-regional imbalances. Thus, small-holder production when well organised has trickling down effect into the local economy and this is of profound importance to the local economy. Though the scholar tackled the issue of production of tea, the trickle-down effects that were noted can be applied to sugar cane production.

Concerning the sugar industry's establishment, Odada (1979) argued that sugar industry provides significant wage employment opportunities to Kenya's fast growing labour force. He noted that about 20,000 people found regular wage employment in the industry, and a much larger number earned regular incomes from sugar cane production activities. This resulted in small businesses and informal activities springing up as a result of spill-over effects of the industry. This argument tries to show the role outgrower farmers play in production of sugarcane. This include giving employment to labourers, getting credit and re-investing in other areas like setting up shops,

plots etc.

Harbison (1966), in his study further noted that rural transformation was a pre-condition for rapid growth of any economy. Other conditions for creation of more productive employment included modernisation of rural communities, the development of small scale industries and the improvement of communication networks, education and health facilities in the rural areas.

To expound on these arguments, Ndegwa (1966) argued that since rural areas must absorb the bulk of the increase in labour force, major efforts have to be made to expand the opportunities for work in the rural areas. The emphasis has to be put on expansion and transformation of these areas. He therefore cited that planners must work under the constraints so that financial, income and employment opportunities must be created if benefits of development are to reach people directly through earned incomes in rural areas. The idea of the role of sugarcane production to rural development as explained by Odada (1979), Harbison (1966), and Ndegwa (1966), is relevant to the situation in Webuye Division and therefore greatly reinforces the contention that agro-based industries have a positive impact on the rural population by

offering employment opportunities, improving income levels and helping speed up rural development as a whole. But the authors do not touch on the likely constraints that can affect the scale of the benefits right from the farm level.

Ogendo and Obiero (1979) viewed the sugar industry as an agrobased one which should be incorporated in the national development planning strategies in rural areas. Through this, the diffusion of new development ideas essential for improving agricultural production, may help raise the general standard of living of the rural people through higher per capita income, better housing and institutional facilities.

Obiero (1980) in her study examined socio-economic impacts of both regional and national development level. The sugar industry was seen as a development point where growth originated and spread to the hinterland in terms of employment, improvement of businesses, infrastructure, which in turn has influence on the growth and development of environs around them.

2.1.2 Problems associated with Production of Sugarcane

In the effort to produce and supply cane to the factory, Obara (1988) in his study on the environmental problems of small scale sugar production tried to give a vivid account of problems that beset small-holder sugar cane growers in the Nyanza sugar belt. This included lack or inadequate labour supply, physical conditions which are not favourable, poor infrastructural base, poor weeding, poor plant spacing. Obara tried to outline the likely problems which is in line with the study objectives. But he only dealt with the physical factors and social constraints but said nothing as concerned the political interference and the price and market policies with their impacts on sugar cane production.

Cotton is one crop that is grown wholly by small holder farmers. Though this industry has contributed to development of rural economy, it has problems. This was noted by Awour R.O. (1979), who in her study, identified various problems facing cotton production. These were malpractices of co-operative officers under-weighting produce of farmers. These practices deprived farmers of their income which is crucial for their up keep and general rural development. Furthermore, most profits went to the ginneries which are in

most cases privately owned. In this case, there is no guarantee that these people will invest in the area. We can therefore conclude that weaknesses facing farmers are from organisation of production to marketing policies. Though these weaknesses are applicable to small-holder cotton farmers, they can be applied to sugarcane production. This can then help form a basis of analysis of constraints to small holder sugar production.

The organisation problem was also noted by 'The Kenya Farmer' issue NO.14 (1982). It noted that benefits rarely accrued to small-holder farmers. This was showed by the pineapple growing. This was due to most problems which arose from the organisation and management. On this basis, one can be out to find out whether this problems of pineapple growing are applicable in study area of Nzoia area sugarcane outgrowers.

2.1.3 Impact of Factor Inputs in Sugarcane Production

Johnstone and SouthWorth (1967) argued in their study that farm productivity can be raised substantially by use of better farm implements, farming systems and improved state of technology all of which combined to increase labour productivity.

Without these supportive factors, even if labour supply was adequate, farm productivity would not significantly rise. The labour supply would lead to a situation of a "labour surplus" economy on the farm accompanied by underemployment of this labour. This case is applicable in Kenya, that is in Western Kenya, where land subdivision is practised. This practice results in uneconomic land parcels rendering labour uneffectively utilized. This further resulted ⁱⁿ to outmigration to towns for better jobs, leaving behind the young and women who are less able to utilize the existing land and therefore affecting yields. This exemplifies further problems which requires rectification.

Bauer, P.T. (1971) argues that with the level of technology existing in the 20th century, natural resources only play a secondary role in a country's overall development. The critical factor being the human capacities rather than availability of capital resources. This exposes the issue of the kind of skills that labour possesses and applies it to farming to improve production levels.

The effect of labour on general land utilization is argued by De Wilder J. (1967). He argues that labour affects general land utilization and farm

productivity. To the peasant farmer, labour has been a scarce factor. In places with high out migration, there is a tendency for agricultural development to stagnate. This is as explained above where able-bodied men move leaving women and children who are less able to work effectively.

The role supporting services play, that is credit facilities, extension services and research to farm production is better explained by Staudt (1982). He argued that those services, where well applied, improve production a great deal. The services tend to favour the better-off farmers in the society, at the expense of the average and poor small scale farmers.

Apart from production being affected by extension services, credit facilities, and existing research facilities, Hermes (1982) argued that production would be determined by the prices offered for farm output in relation to cost of inputs. This will try to give an insight on how these facilities really affect production of small scale sugar production in Webuye, whether, from the farmers views, they are accessible to these facilities or not.

Akungo (1980), in her study in Mbita division, South Nyanza, looked at constraints that face agriculture. He found out there was lack of transport

infrastructure, and physical factors such as infertile soils and inadequate rainfall. While Mwangi (1978) noted that small scale farmers account for more than 50% of the country's agricultural production, they use less than 1/3 of chemical which can greatly help increase farm yield in the country. There is therefore need to encourage the small scale farmers to adopt use of more fertilizers if higher farm productivity is to be attained. He noted that these high farm productivity could be attained by accessing credit facilities to the farmers to buy fertilizers and other inputs so that they are used on time and in appropriate packages close to the farmer. This could help cut down on transport costs which tends to raise the overall production cost. This argument is so in-line with the stated study objectives which the researcher will try to explore to what extent the use of inputs, and credit facilities have affected sugar cane production in Webuye Division.

2.2 Theoretical Framework

In conclusion, this literature review tries to outline specific theoretical arguments which directly relate to the study objectives. It tries to explain ways in which agricultural production can be affected

by certain inputs and the role that the small-scale farmer plays to the whole population by offering employment, re-investing and general development of the area. These and other issues not discussed can be used in similar studies depending on the scope of the study objectives.

The first approach outlined is the use of inputs approach to improve production. These include use of fertilizers, insect killers, better and improved farming implements, adequate labour supply and capital. Empirical evidence shows that incases where fertilizers are added to the soil, using right quantities and with proper timings, yields tend to be higher than when production is done within plain soils. Labour as an input also affects final production because where its able to work efficiently and promptly so that delays in weeding and harvesting are rooted out, it means better yields. Better farming implements like tractors work more efficiently and hence produce better results. Only a sound capital base will facilitate the adoption of the above inputs for better yields and hence good incomes.

The use of the above inputs needs an institutional back-up to work effectively. For instance, a farmer has to be trained on how to apply

fertilizers, what quality to use, in what quantity and during which time. These therefore calls for the access to extension services, which should be well trained in disseminating their skills. Therefore the availability of training centres is a necessity in adopting and using inputs. Furthermore, these inputs might be supplied on credit or in other cases, an individual has to buy them. There is therefore need for credit institutions like co-operatives of the farmers themselves, or other lending institutions like commercial banks, A.F.C., etc. This should be in close proximity to the farmers and with better terms of lending. A sound research base is necessary in the case of farmers trying to use better varieties of seeds, which could be drought resistant, or resistant to diseases. Research institutions should be intensified, so that better varieties are adopted.

Before the above institutional set-up outcomes reach the target group, who is the small scale farmer, there's need for a firm physical infrastructural base. Inputs have to be transported to the farmers, and these calls for better and adequate road network. People have to travel to disseminate their arts, like the extension staff, can only move easily and make enough contact if accessibility is possible.

But the above approaches will only work if the physical conditions are favourable, like rain, soils, and climate for growth of the concerned crop. The management and farmers relationship should be such that no problems crop up because of the poor relationship.

In line with the literature review and the theoretical framework of the study objectives, there is need for background information of the study area with the policy framework of agricultural sector which is tackled in the following chapter. This will help the reader to understand the research problem in the context of its background and how the physical factors and the policy formulations have affected sugarcane production.

CHAPTER THREE: BACKGROUND INFORMATION OF THE STUDY AREA.

This chapter introduces the reader to the main salient features of the District in general, after which each section breaks down into the specific study area. To be discussed in this chapter there-fore will be. location and size of the study area in both national and regional context. Physical factors, climatic conditions, ecology and water resources will then follow. Soils and landuse patterns will also be tackled in this section. This will be mainly to try and understand how the soils have influenced the landuse patterns. In order to appreciate how the resources in the study area have been exploited, demographic characteristics and employment will be considered. This will generally refer to the socio-economic profile of the District. The chapter will further contain an analysis and review of the policy background of the agricultural and the sugar sector. It will find out how this policy implications have affected the small-scale agricultural sector. The chapter will end with a section containing the historical development of sugarcane production. It is hoped the above will go along way to prepare the reader in appreciating to what extent physical

characteristics and policy implications have affected sugar cane production.

3.1 Location and Size

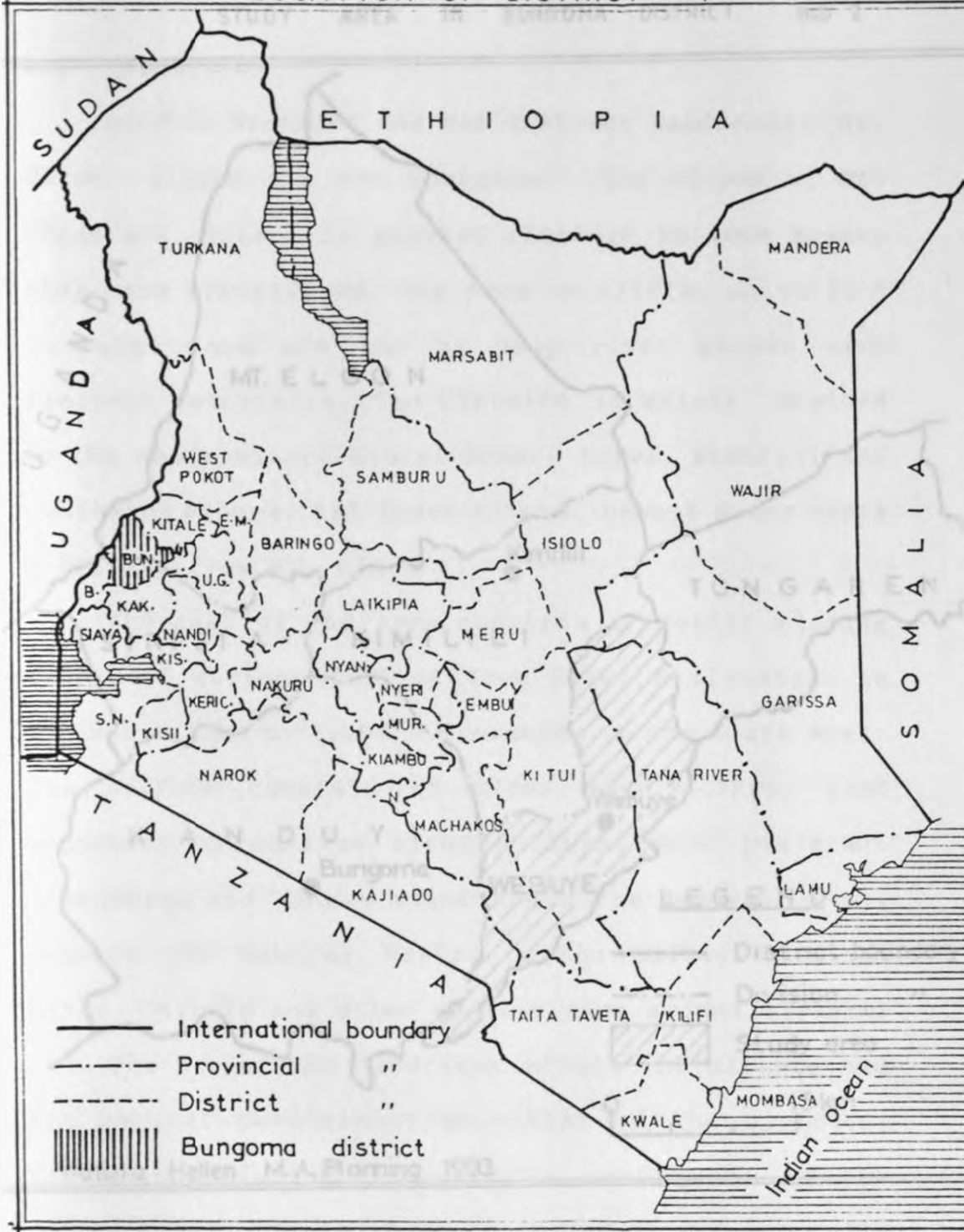
Bungoma district is situated on the Southern slopes of Mt. Elgon, forming the most Northern part of the District. It borders the republic of Uganda to the North West, Trans Nzoia District to the North, Kakamega District to the East and South-East and Busia District to the West and South West. The District lies between latitude 0° and $1^{\circ} 30'$ North of the equator and longitude $0^{\circ} 21'$ East and $35^{\circ} 15'$ East of the Greenwich Meridian. The

District has an area of $3,074 \text{ km}^2$ and is within the Lake Victoria Basin, rising from 1,200 M above sea level in the West and South West to over 4,000 M above sea level to the North.

Administratively, Webuye Division is divided into seven Divisions, Mt. Elgon having been recently split to form Kapsakwony and Cheptais Divisions. There are 24 Locations, and 73 Sublocations. The location of Bungoma District on national context is as seen on map.1

While the administrative boundaries are as seen in map.2

LOCATION OF DISTRICT map 1





3.2 Topography

Bungoma District has two distinct landforms; Mt. Elgon slopes and the lowlands. The slopes of Mt. Elgon are generally gentle, although in some areas, they rise abruptly in the form of cliffs, up to 70 M in height and are cut by deep river gorges with frequent waterfalls. The District is mainly drained by the Nzoia River, Kibisi River, Kuywa, Kimilili and Lwakhakha Rivers. All these rivers, except River Nzoia originate from Mt. Elgon.

The rest of the area consists of gently sloping erosional surface falling from 2,100 M elevation in the North East to 1,200 M elevation in the South West. The surface consists of wide, nearly flat, land separated by shallow river valleys. More resistant inselbergs and ranges stand above the general level, forming the Kavujai Hills, Luucho Hills, Sang'alo Hills, Mwibale and other smaller ones around Sirisia.

The relief and landforms affect the climate and the general development potential of the District. The gently sloping terrain in most parts of the District, accompanied by fair rainfall and generally good soils, provide a very productive arable land. The few areas where land rises abruptly as cliffs have limited potential for generating hydro-electric power

for small scale projects.

The location of the District on the slopes of Mt. Elgon influences rainfall and mitigates temperature. The mean annual temperature in the Southern parts, away from the mountains are about 21 to 22 degrees centigrade, while the mean annual temperature in the Northern areas closer to Mt. Elgon are in the lower range of 5 to 10 degrees because of altitude. This is explained by the fact that the higher one goes, the cooler it becomes. There's sufficient sunshine in most parts of the District.

3.3 Ecology and Water Resources

Bungoma has a high Agricultural potential. It experiences two rainy seasons, the long and short rain seasons. The long rain season normally starts in March and continues into June or July while short rains starts in August and continues into October. Most of the rain falls in the long season and is heaviest during April and May. Most farming activities take place during this long season, such as planting, weeding and top-dressing.

The North, North-Western and Southern parts of the District tend to get the heaviest amount of rain, while Central and Eastern parts get less. Rainfall

normally ranges between 1,250MM to over 1,800 MM per annum.

Sugarcane requires an average optimum rainfall total of 1,500 MM per annum, although it could do with less. The rainfall should be evenly distributed throughout the year in order to ensure a constant healthy growth. The ideal minimum level is 1,000 - 1,300 MM per annum.

This shows that the District has enough rainfall for sugarcane growing and the rain is fairly well distributed. There is no problem of rainfall affecting growth of sugarcane and therefore affecting the eventual yields in the District.

3.4 Temperature

The air temperatures in Webuye Division average between 25 degrees and 33 degrees Centigrade for maximum levels. Sugarcane requires moderate to high temperatures for quick maturity and germination of seed-cane. The temperature is quite adequate in the study area.

Soil temperature is universally related to rainfall amounts. This is quite suitable in the study area, therefore no problem of temperatures prevails.

3.5 Soils and Land-use Patterns

The District has a wide range of soil types:

1. Excessively drained soils on hills and minor scarps,

These soils are stony and rocky, varying in colour and texture. They occur in the centre of the District and are a minor type.

2. Mountain soils:

These soils are found on Mt. Elgon and are derived from Olivine basalts and ashes of the old volcano. They are rich in organic matter though the organic layer decrease in depth downhill. They vary from the well drained moderate deep, dark reddish brown, stony clay loam cambisols to the imperfectly drained dark greyish brown clay loams or histosols with lithosols.

3. Soils on Volcanic Footridges:

These are the well drained extremely deep friable and slightly smeary clay soils. They occur in the Northern part of the District succeeding the Mt. Elgon soils.

4. Soils on Foot-slopes:

These are well drained, very deep and dark reddish brown soils. In some cases, they are moderately calcarean clay, while in others, they are

dark yellow brown of varying consistence and texture. They occur in the Northern part of the District just above 1,800 M altitude.

5. Soils on Upper Middle Level Uplands:

These consists of millic and humic nitosols and are well drained, extremely deep, dark reddish brown with humic or acid topsoil. They occur in the Western part of the District.

6. Soils on Lower Middle Level Uplands:

These are well drained, deep to very deep varying from red dark to red nitosols and ferralsols; and brown to dark brown acrisols. They have developed on basic igneous rocks and granites. They occur in the Western and North-Eastern parts of the District.

7. Soils on Lower Uplands:

The soils consists of well-drained moderately deep to very deep, reddish brown to yellowish brown or dark brown clay ferralsols and acrisols. They occur mainly in the Eastern and Southern part of the District.

8. Soils on Bottom Lands:

These consist of soils developed on infill, mainly from undifferentiated basement system rocks. They include complex poorly drained very deep and dark grey to brown clay soils. They occur in the North

East, Central and Southern, plus southern Western parts of the Districts in tiny pockets.

The good soils, coupled with gently sloping terrain in most parts of the area, makes the District one of the most arable in the republic. However, poor farming methods have been applied on the slopes of Mt. Elgon and on the inselbergs and hills, causing serious soil erosion. The situation is made worse by hailstorms which are common in the area and which assist in carrying away the already exposed soils.

Moreover, a large part of the District is covered by fairly shallow soils. The most notable areas are Mt. Elgon and the southern region. Without proper management for agricultural activities, these soils are easily degraded.

The area lying below 1,500 M elevation forms a basin which is more to swamps, water logging and flooding especially along River valleys. Clay soils are prevalent and during the wet seasons, they render roads impassable. During dry seasons, they crack making ploughing and early planting difficult. The swamp have potential for rice production with proper landuse management.

On the whole, the District has two types of soils. Those soils with moderate to high fertility

and those with low fertility. Moderate to high fertility soils are found on the slopes of Mt. Elgon and have high organic matter content. The high level of soil fertility combined with high rainfall and temperature have made development of a tea zone on the lower reaches of Mt. Elgon forest possible.

Cultivation is limited by very steep slopes on the lower slopes of the mountain where land tends to rise abruptly. Further west, there is a zone of moderately fertile soils, but the rest of the District has soil with low fertility. About half of this zone's soils are shallow with sections of steep slopes and large belts prone to waterlogging especially along rivers.

Sugarcane growing requires soils that are deep, friable and not waterlogged. The clay loamy soils are normally preferred and high soils are better as they have the distinct advantage of adequate natural drainage. They ought to have a good structure with reasonable fertility.

Infertile soils may be improved through appropriate application of fertilizers. Poor soil structure can be improved by repeated deep ploughing and harrowing while poor drainage can be improved by construction of appropriate drainage networks across

and along fields.

3.6 Land Tenure

Most of the land in the District is privately owned and many people practise small scale mixed farming. These small farmers keep animals in addition to growing cash crops and food crops.

The number of holdings are 89,392 with an average of 4.8 HA. per holding. The largest holdings are estimated to be 80 HA. and the smallest as 2 HA. The large holdings are quite few and found in the settlement scheme in Tongaren area. The District has an estimated total of 2.5 million HA. of arable land.

The system of land use practise where land has to be subdivided among sons of the owner is posing a serious problem. This is because the increase in population is leading to subdivision of land into small plots which will soon become uneconomical. 30% of the farmers have adopted the use of fertilizers both organic and inorganic, and about 90% use certified seeds. But the need for changing from dominant type of cattle, the zebu cattle, is still far from being satisfied.

Most of the land belongs to individuals who have been issued with title deeds. This has the advantage

of motivating farmers to develop their plots effectively, through acquiring loans against title deeds.

3.7 Demographic and Settlement Patterns

3.7.1 Population Density and Distribution

In 1979, the population census was 503,935 people in Bungoma District, having risen from 345,226 in 1969, giving an inter-censal annual growth rate of 3.85%. Between 1979 and 1988, the population was expected to increase with an estimated average growth rate of 4.2% per year reaching about 731,411 people in 1988. The growth rate was projected to be about 7,874,862 by end of the plan period, based on the assumption of gradual decline in levels of fertility and mortality. The projected growth rate was expected to decline, averaging 3.65 per year.

In 1962, population density for the whole District was 70 rising to 112 persons per KM in 1969 and 164 persons per KM. in 1979.

3.7.2 Population Structure

The population structure is pyramidal, with most of the population being found in the lower parts of the pyramid and much fewer people at the top and

TABLE NO.1 Population by Divisions in Bungoma

Division	Population	% of District Population	Density per Sq. km
Kanduyi	168,087	33.4	204
Kimilili	99,746	19.8	252
Mt. Elgon	78,173	15.5	221
Webuye	59,704	11.8	229
Tongaren	49,458	9.8	131
Sirisia	47,840	9.5	193
Elgon	927	0.2	2
Forest			
Total District population	563,395	100%	164

Source: Kenya Population Census 1979, Vol. 1
Central Bureau of Statistics, page 122-123.

3.8 Socio-economic Profile

This reflects the profile of the whole District of Bungoma. The District has land area of 307,400 HA. Out of this, 232,590 HA. form the agricultural land of which 135,323 HA. and 97,267 HA. are high and medium potential land respectively. The remaining 74,810 HA. is beset by serious limitations of steep slopes, mountain and water logged, together with forests and rivers.

Agriculture is the main stay of the Kenya's

economy, and it accounts for over 75% of the employment in the District. Majority of the people are engaged in small scale mixed farming. Many of the land holdings parcels fall under 10 HA. per household. Both cash crops and food crops are grown on small scales.

Livestock is kept by the majority of people for prestige, that is as a form of wealth. But the farmers are increasingly keeping dairy cattle for commercial milk production, oxen for farm work activities and poultry for market. The main food crops and maize (also grown as a cash crop) millet, sorghum, sunflower, wheat, tobacco, pyrethrum and sugarcane.

Sugarcane is grown in the Southern and Western parts of Kimilili and Western parts of Webuye Divisions.

There are 4 industrial establishments in the District, Pan African Paper Mills at Webuye, Sugar factory at Nzoia, Milk Processing Plant (Kitinda) in Bungoma town and cotton ginnery and oil extraction and processing factory at Malakisi.

At beginning of 1979-83, Development Plan period, the District per capita income was KSh.750 (Development plan 1979-83).

3.9 Policy Background of Agriculture and Sugar Industry

This section tries to give an analysis of the Kenyan Government policy on agricultural development, particularly its role in stimulating small scale farm production.

Government policies are a set of statements expected to guide a course of action to be adopted by the government in realization of certain set objectives.

Sugarcane has had little prominence in terms of policy, as compared to maize, wheat, tea, coffee, sisal etc. Despite this limitation, sugar sector has undergone two major changes since independence, namely;

- the involvement of small scale farmers
- the massive investment in factories by the government.

This has followed broad economic policies of the country, as well as policies that have been specifically directed at the sugar sector. A key factor affecting the sugar sector is that the major policy thrust has been oriented to satisfying the domestic market.

National and Agricultural sector policies which

affect the development of the sugar sector are spelled out in various Development Plans and Sessional Papers.

The following is an account of policies that affect sugarcane only as per the set objectives of the study, thus, problems associated with the production of sugar, taking into account factors like fertilizers, seedcane, capital, infrastructure, credit facilities, extension services etc.

Before independence, there was the Swynnerton Plan of 1954 which was aimed at reforms in land tenure systems, introduction of cash crop production, provision of credit and other agricultural services. It recommended land adjudication and consolidation so as to encourage a freehold land tenure system, with registered title deeds which could be used as security in credit acquisition. This policy encouraged cash crop farming in non-scheduled areas.

The Swynnerton plan therefore partly accounts for the success of small-holder farmers entering into cash crop farming. But this resulted in the emergence of a dualistic agricultural sector. This included a cash crop sector which was largely export oriented and a subsistence sector mainly growing food crops and to some extent domestically oriented. After independence, agricultural policy has been guided by

a strategy aimed at attaining agricultural growth, equity in these growth and stability of farm incomes, as well as a greater participation by small-holders in cash crop production. It aims at attaining self-sufficiency in sugar production while earning foreign exchange through exports. There is a detailed long term sugar development programme that has resulted. This entails investment proposal for rehabilitation and expansion of existing sugar factories and establishment of new sugar projects.

Sessional paper No.10 of 1965, noted the role agriculture was expected to play in the economy if developed. These were:

- meet domestic food requirements,
- increasing earnings of farmers and,
- increasing foreign exchange earnings.

First National Development Plan (1966-70) had its concern on growth of the economy and its africanisation. Land consolidation and registration activities were carried on, and settlement of the landless in the newly created settlement schemes of the former white highland areas. The land title deeds which were issued during land registration were expected to be used as collateral by the small-holder farmers to acquire credit for farm development.

The First National Development Plan therefore saw the landless being settled in former scheduled areas through the settlements schemes programme. It further saw an extension of the high levels of agricultural production previously confined to the former scheduled areas to other small-holder areas. This was to be achieved through reforms in land tenure system. This meant the introduction of free-hold land tenure system which would be secured by use of title deeds. The consolidation of formerly fragmented holdings into single piece would be done where possible. Extension services, farm inputs and campaigns for cash crop adoption like coffee, tea, cotton, and sugarcane would be availed.

The above objectives raised some conflicting issues. Land registration and consolidation contributed partly to the problems of landlessness, especially in some high density areas. Encouraging high value cash crops had its implications on the debate on food production as well as social stratification of the rural farmers. Land consolidation increased the risks of production to farmers in case of crop failure in areas of diverse ecology, due to a limited degree of fragmentation.

Second Development Development Plan (1970-74),

put more emphasis on rural development because most farmers lived in the rural areas and depended on agriculture. Land adjudication and registration was to continue, while credit and extension services to small scale farmers were to be increased. Transport infrastructure, marketing, price policies, and mechanization, use of farm inputs like fertilizers were to be considered. The plan showed that many small scale farmers were to continue experiencing difficulties in obtaining short term credit.

During the plan period, expenditure on the Ministry of Agriculture accounted for 20% of the total expenditure by the government. Within the Ministry, land adjudication and consolidation expenditure fell to 15.9% from 31% in the First Plan Period(1966-70). Over the plan period, agricultural credit was allocated K£.4.7 million by the ministry and Agricultural Finance Corporation resources of K£2.4 million, totaling K£7.1 million for credit. Credit allocation by the ministry therefore reduced from 13.8% in 1966-70 plan period to 11.9% in the 1970-74 plan period inspite of the plan laying greater emphasis on credit provision.

Third National Development Plan (1974-78) continued to emphasise the above policies of 1970-74

plan period. The plan stated that agricultural development would help attain equity in incomes by encouraging cash crop farming. Expenditures by the government were to be mostly channelled on programmes of extension services, training and research, farm credit, input supply and land adjudication. Intensified agriculture was encouraged in areas where land title deeds had been given and could act as securities in credit acquisition by farmers. In-service training was to be continued to replenish their knowledge on technical production and to learn more about farm management. Emphasis was placed on mass media and group approaches for delivering extension service, rather than individual farm approach. The individual farm approach was faulty because extension staff were too few to cater for all the farmers. This meant group approach would help reach a larger proportion. The individual approach tended to favour well-off farmers at the expense of majority of the poor rural farmers. This individual approach therefore contributed to rural income inequalities as a result of the better-off farmers adopting new and better farming techniques. This was detrimental to the government policy of growth with equity.

Agricultural research was aimed at developing better varieties of crops and livestock as well as better production techniques. Extension services were to help in raising productivity by delivering expert knowledge. This was therefore supposed to be backed by a well co-ordinated research programme which addressed itself to practical problems of the farmer. They were to have continued access to relevant research findings to update their technical knowledge. However, research funds allocated for research was only K£285,000 out of K£9,021,000 or 3% over the plan period inspite of the great value and expectations interms of increased crop yields.

Expected problems during the plan period would be inadequate finance/credit and extension facilities etc. This would be faced by the small-holders.

By mid 1970s, credit provision showed a tendency of neglecting small-holders credit requirements. Small-holder credit was arqued to be too costly to administer resulting in high administration costs and defaultng rates. In 1972, for instance, out of AFC loan portfolio of K£14.2 million, only K£2.5 million or 17.6% was lent to 14,500 small scale farmers. This is in comparison to K£12.0 million lent to 2,500 large scale farmers (Development Plan 1974-78). In addition,

a total of K£3.1million was lent to 5,500 farmers in 1977-72 financial year under the Guaranteed Minimum Return. But these were restricted to farmers with a minimum of 6HA. of either wheat or maize. This condition meant that most small scale farmers did not qualify for these loans.

Thus, while land adjudication and registration was undertaken largely as a way of allowing small holders to get title deeds which they could use as collaterals to secure credit, the principle government lending body, AFC, had most of its loan going to large scale farmers and its loan disbursements to small-holders was able to serve little more than 1% of the total small-holders.

Fourth National Development Plan (1979-83) had its theme as alleviation of poverty throughout the country, with small scale farmers being among the target group. The plan aimed at increasing incomes among small holder families, by creating income earning opportunities in the rural areas.

Rural development projects would enable small scale farmers and pastrolists in ASAL to participate more fully in the monetary economy. This is because part of the poverty of these target groups was blamed on their lack of physical access to markets and

commodities available in the monetary sector. Projects like Rural Access Roads would be undertaken to enable easy flow of farm inputs and outputs, availing extension and credit facilities to the farmers and focusing agricultural research into identification of inexpensive and easy ways to maintain technology so as to stimulate small farm productivity.

Saving and credit facilities were to be given priority to small scale farmers. This small scale agriculture was given emphasis of development because it supported about 80% of the population and because they produced more per area, fully utilised their land holdings and employed labour-intensive methods of cultivation, thus offering employment in the economy.

They acted as a source of subsistence, and cash crop production, therefore if developed, it would be a way of promoting land utilisation efficiency resulting in higher output per hectare.

During this period of (1979-83), the *Integrated Agricultural Development Programme (IADP)* was launched. Here, a concentration of services affecting small scale farm productivity was attempted. It was expected to help stimulate a higher use of farm inputs like fertilizers and the transfer of new production technologies to the farmers, and

facilitating efficient marketing of farm produce.

The experience of (IADP) has been such that 30% of the farmers have adopted the use of fertilizers both organic and inorganic and about 90% use certified seeds. But the need for changing from dominant type of cattle i.e the zebu type, is still far from being satisfied.

Research and extension services were to be oriented to alleviating production constraints in the small holder agriculture. Constraints or problems included

- a) use of inappropriate farming technology,
- b) poor implementation of projects and
- c) financial problems.

The above average and progressive farmers tended to be favoured by extension services and information staff. This constituted only a small percentage of the rural farming population. The extension services were therefore to be oriented to undertake group extension programmes so as to reach more farmers and to use appropriate media, and as well as to research into small holder production.

A.F.C. was to be more involved in small farm credit provision, while large scale farmers were to get most of their credit from Commercial banks.

In Webuye Division, most of the farmers are never visited by extension workers. There is the element of discrimination, in that only the progressive farmers are paid visits. Further-more, the extension workers are too few to reach all the farmers. This, coupled with the poor infrastructural base in the Division has hindered the efficient dissemination of ideas from the extension workers. Though most house-holds had land title deeds, only a small percentage of them had used it as collateral to secure loans.

The Fourth National Development Plan (1979-83) noted the continuation of the policy favouring small scale farmers development. Small-holder credit would continue to come mainly from A.F.C. The state directed that Commercial banks allocate 17% of their deposit liabilities to agricultural lending. This was hoped would help meet the growing demand for credit in the agricultural sector. The non-banks financial institutions were also to lend 10% of their deposit liability to agricultural sector, but this has not been achieved. This is because they claim that agriculture as a sector, credit is too risky, hard to manage given the sectors dependence on natural factors such as climate, rainfall etc and the generally low credit managerial skills among the rural farmers. This

is showed by the high defaulting rates by borrower experienced by AFC.

The government therefore was considering to develop the *Agricultural Development Bank* during this period to mobilise funds for financing agriculture. Small holder credit was likely to be strained during this plan period.

The plan saw the launching of the *National Extension Programme (NEP)* which was to use the training and visit (T & V) method of delivering extension services. This method involved selection of few farmers to act as "contact farmers" in areas covering a certain radius, on whom fortnightly visits would be made by field extension staff. The contact farmer would have a number of farmers attached to them who would learn from the extension staff during his visits to the farmers. The extension staff would then attend monthly training sessions to learn on new development in technical matters, as well as farm management. The "Train and Visit" method is therefore designed to offer a two-way communication channel between the farmers and the field technical staff.

Sessional Paper No. 1 of 1986 noted that the government policy in agriculture would continue under the pricing and marketing policies, improved

provision of extension services, and the control of pests and diseases. Research would be mobilised into higher yielding seed varieties and diseases as well as drought resistant crops. The paper argued for crop diversification especially the growing of high value cash crops like coffee, tea etc so as to generate high farm incomes in the rural areas and help create gainful employment opportunities.

National Development Plan 1989-93, notes that effective promotion of increased and widespread adoption and use of improved seed varieties, fertilizers, pests and chemical diseases control should be the stress of the plan period. The central objective of the government's agriculture and livestock input policy is to ensure their adequate availability, at the lowest possible farm-gate prices, at the right time and in the right quantities. The inputs are fertilizers, seed, feed, pesticide, farm machinery, artificial insemination, and animal health services.

While the government will aim at increasing the use of fertilizers by all farmers, particular attention will be paid to the needs of the small-holder. The system of distribution of fertilizers in small packets will be extended to

facilitate access to the small farmer, though transportation requirements will stand as a constraint.

The extension system will be strengthened to propagate education on right types, quantities, and timing of the use of fertilizer inputs, thus guaranteeing highest returns to the farmers. Research institutes will be required to re-double their efforts in developing and screening other improved seed varieties. As concerns farm machinery and equipment, an appropriate and cost effective mechanization system will be determined.

The major lenders of credit to the farmers will remain Commercial bank which is expected to give 48% and AFC 20% while private non-bank financial institutions 18%. The private sector will be expected to make a greater contribution by ensuring incentives are given to them through infrastructure improvement, pricing, marketing and input supply are vigorously pursued. More use will be made of the seasonal credit scheme.

Concerning agricultural extension the training and visit approach will continue being practised. This ensures transfer of knowledge and farming skills through close contact with farmers on basis of a

regular visiting cycle. The possible constraint will be transport. The private sector will be expected to play an increasing role in training and giving these services to farmers. It is noted that the government will fully incorporate informal training education extension package with train and visit to especially meet the needs of women who are the backbone of farming operations in rural areas. This will be through the use of organised women groups. The government will make deliberate and concerted efforts to ensure that women play a greater role in agricultural production, mobilisation of farm incomes and accessibility to land.

Production in agriculture depends on the application of scientific knowledge in generating improved technologies and effectively applying them to production systems. It is on the basis of these technologies that extension service design the necessary advice and production packages for the farmers. In doing so, the agricultural sector will be trying to meet the following objectives:

a) helping in the production of food and other farm products at costs the farmers can afford.

b) improving the quality of agricultural products to meet domestic demand while competing effectively in

the export markets.

c) protecting crops and livestock from pests, diseases and environmental hazards.

d) protecting local and foreign consumers from health hazards arising from contamination from use of fertilizers.

e) supporting a productive agricultural sector through environmentally safe and efficient management of resources, man, soil, water etc.

f) helping to raise income levels and hence quality of life in rural areas.

The constraints that are likely to hinder the realisation of the above cited objectives are;

1- absence of comprehensive management systems to options on available human and financial resources.

2- absence of a well defined bit of priorities to determine direction of research.

3- lack of system of monitoring and evaluating research projects.

4- under-funding the research projects because of the heavy dependence on government budgets which is being strained.

In conclusion, while policy statements have tended to stress the importance of the agricultural sector, and the small-holder farmer in particular, a number of

government decisions from sectoral expenditures to intra-ministerial expenditures have not favoured small-holder agriculture. They have amounted to maintenance of a selective alliance of successful small-holders who are a minority. This increases the bimodal structure of agricultural producers i.e the subsistence and the monetary sectors. The post independence policies as practised rather than stated have tended to promote large scale farmers and the partly better-off farmers. Concerning credit acquisition, the principle lending bodies have continued to discriminate against the small holders. The dissemination of research findings have failed to reach farmers due to inadequacy of extension services. Further-more, the extension workers are discriminative and prefer the better off and progressive farmers at the expense of the poor farmers who form the majority group.

This review on the agricultural sector will help in the assesment of the impact of these policies in the development of the small-holder agriculture.

3.10 Historical Development of Sugarcane Production

Sugar production in Kenya began in the 1920s with the establishment of two private owned factories,

i.e. Miwani sugar mills and Ramisi sugar company. In the following 40 years, no new factories were constructed and the country depended privately on sugar imports to meet the growing domestic sugar demand. After independence, the Kenyan government embarked on a programme of expansion of the sugar industry designed to attain evaluated self-sufficiency in the sugar production, thus reversing the trend of increasing sugar importation (KSA, 1990).

The expansion programme was intended to provide a further source of income opportunities for small farmers as well as to assist in the general rural industrialisation strategy.

Between 1966 and 1975, five new schemes were established at Muhoroni, Chemelil, Mumias, Nzoia and South Nyanza. The domestic production of sugar increased very steadily as a result of this expansion culminating in the attainment of a self-sufficiency position in 1979 at a record production of just over 400,000 tonnes. Thereafter, domestic production declined and occasional imports have been necessary to satisfy the rising demand.

Since 1987/88, the total domestic production has increased to the 1980 levels of just over 400,000 tonnes, but this has not been able to satisfy the

domestic demand which is estimated to be over 500,000 tonnes per year or about 20 Kg per capita. In 1989/90, total domestic production was about 440,000 tonnes.

The sugar industry has a high degree of wage labour-input in land development, maintenance, harvesting, transportation and processing, and thus it greatly assists in rural employment generation per unit of land. It is a source of massive employment to many small scale farmers and other employees in the industry. At present, nearly 70,000 outgrowers are estimated to be supplying sugar cane on a regular basis to the existing operating industries. Over 30,000 people are employed on casual terms in cane production, sugar production and marketing activities (KSA, 1990). Considering members of the households of those directly involved, then it can be estimated that the sugar industry supports over one million people in Kenya.

Surpluses in the sugar industry were achieved following development in the sugar industry's demand. Self-sufficiency was temporarily attained by the country and it managed to export 94,674 metric tonnes of sugar in 1980.

Consumption has increased very steadily due to

population growth and increase in income levels. Therefore, to stabilize, the domestic supply, importation of shortfalls has been done to meet the increasing consumption requirements and build strategic reserves.

The performance of the sugar industry in Kenya is faced with problems ranging from poor management to high investment costs which seriously affect it. Most of the sugar factories have accumulated huge losses over the years while some factories have been unable to meet the intended levels of output in their plants.

The performance has been affected by the high charges on foreign loans and the Kenya currency depreciation or devaluation. This increases the costs of most of the factory spares and raw materials which are imported.

In summary, the success of the sugar industry depends, largely, on the availability of sugar cane in sufficient quantities to sustain existing or planned sugar factory capacities. The amount of cane supply is dependent on the land area that is put to cane cultivation and the productivity of the land thus set aside. Cane yield is expressed in terms of the number of tonnes that may be obtained from harvesting

one hectare, that is TC/HA.

Other factors affecting performance is the changes in domestic fuel prices which is offset by the adjustment in the producer price of sugar cane and sugar as well as land preparation and transportation rates. Any worsening of exchange rates can adversely affect factory performance, or profitability as this increases the depreciation expenses of assets held in foreign currency as well as imported spare parts.

The major factors that affect cane yields are:

- a) Soil type and its fertility
- b) Rainfall pattern, the amount of rain available and its distribution
- c) Farm management practices as they affect the following operations:
 - (i) land preparation and cane planting
 - (ii) selection of sugar cane varieties for given ecological and climatic conditions
 - (iii) crop maintenance with special emphasis on weed control and application of fertilizers
 - (iv) availability of sufficient funds for cane development and maintenance.
 - (v) State of harvested cane, whether plant crop or ratoon and its age.

The Kenya government is keen to see that sugar

factories perform efficiently in order to realise self-sufficiency in sugar production, with some surplus for export if possible. This is shown by the steady expansion of milling capacity over the years since independence. In order to achieve this objective, sugar production must be profitable to the major participants in its production, the farmers, transporters, and millers. The producer price to the farmers, the transport rates for cane transporters and ex-factory price to the millers should cover the actual cost incurred by all the parties. These costs vary all the time depending on the prices of the major inputs e.g. petroleum prices and spare parts. Hence prices in the sugar industry are reviewed annually to accommodate any changes in the cost of sugar production.

The outgrowers, as opposed to nucleus estates are managed by sugar companies and apply appropriate inputs required for cane growing. The outgrowers are usually small scale, with limited capital to apply the optimal technology packages to sugar cane cultivation and maintenance. Other things being equal, therefore, the yields obtained by outgrowers are usually lower than those of the nucleus estates. The outgrower farmers are normally within the radial distance of 16

to 21 Km, grow cane and therefore supply the bulk to the factory's requirements. In 1991, overall, the outgrowers supplied about 87% of total cane output compared to 13% produced by nucleus estates. On average, they produce 85% of total cane.

3.II Organisation Of Outgrowers

At the national level, outgrower farmers have formed the Kenya Sugar Cane Growers Association (KESGA) as the apex body to represent their sugar interests. It provides a forum where sugarcane growers can discuss and propose policy issues affecting the sugar industry. At zonal level, outgrower farmers have formed the Nzoia Outgrower Company (NOCO), which is very recent.

The organisation and management of outgrowers are important contributory factors to cane production. Zonal outgrowers' organisations are meant to assist their members in securing credit and inputs, and coordinating harvesting, transportation of sugarcane to the factories.

CHAPTER FOUR: REPORT OF SURVEY AND ANALYSIS.

This chapter is an assessment of the role that outgrower farmers play in the production of sugar cane and the factors that hinder better production of sugar cane. The chapter will thus give a report of the field survey which will be followed with an analysis of the findings. The report will start by giving an account of the respondents socio-economic characteristics and how they affect sugarcane production. The role of the outgrowers in the production of sugar cane will then follow. The chapter will then end with the constraints to better production of sugarcane.

4.1 Respondents

From the field survey, out of the 80 number of respondents interviewed, 91.3% were males while 8.8% were females. with an average age of 45 years. The difference in percentage exposes the gender issues, whereby men are the head of households, sole decision makers and hence the only viable people to give out any information as concerns the household.

Education is important for agricultural development. It helps in shaping farmers perception and willingness to adopt new farming techniques. 2/5

of the respondents had primary level of education, while over a half of the respondents had secondary and above education.

All the respondents practised mixed cropping with competing crops being maize, beans, coffee, bananas, potatoes, sunflower and vegetables. 1/3 of the respondents chose to grow sugarcane because, as a cash crop, it was more profitable in terms of returns. Sugarcane has a higher crop gross margin per hectare per year as compared to other crops in the District as seen below in table no.2

Table No. 2

	Gross Margin/yr/ha
Sugar cane	- 8,062.40
Maize	- 1,596.20
Coffee	- 4,394.30
Dairy	- 4,430.00
Sunflower	- 1,165.00
Poultry	- 38,600.00

Source: Kenya Sugar Authority (1989)

The higher gross margins show why most small scale farmers ventured into sugar cane production as their major cash crop. The government's food production policy states that sugar zones are supposed to allocate part of the available land to

food crops before being allowed to grow sugarcane. This explains the existence of mixed cropping. Though there are crops with higher profit margins, it's unlikely that many farmers will abandon sugarcane and grow onions, tomatoes or keep poultry on the same piece of land. This is because such crops require less familiar specialised skills in management, and usually such gross margins are based on small plots which are enlarged into hectareage analysis basis.

Of the respondents, 57.5% were full time farmers with no other occupation, while 32.5% had wage employment apart from growing sugarcane. Of these respondents 65.0% had an income level of less than 2000 Ksh. Those earning more than 3000 KSh. were 33.8%. This implies that most of the farmers live in poverty with little incomes, most of which was used to buy food and none left to purchase inputs and hire labour to enable efficient production of cane. Off-farm activities are a source of off-farm income which is a useful source for investment (Collier and Lal 1980). Therefore the introduction of off-farm activities to the farmers would improve the farming situation in the area, since income generated from this activities would be used incase of any need arising.

Respondents farm sizes varied between 2.5 HA to 200 HA. 68.8% of the respondents had less than 25 HA. while only 6.3% had over 50 HA. of land. This shows that majority of the outgrower farmers are small scale farmers. The hectarage under cane varied from 0.8 HA. to 150 HA. with an average of 13 HA. under cane in the Division. This implies that most of the farmers have a big proportion of their land put under cane as compared to other competing crops. This had an effect on food supply in that, 53.8% of the respondents were of the view that land was not enough for both food and sugarcane production. The amount spent on purchasing food varied from less than KSh.1000 monthly on food, to KSh.1000 to 3000. Taking into account the monthly incomes of less than KSh.2000, one can then conclude that sugarcane growing has reduced food production in Webuye Division and caused an increased expenditure on food.

When respondents were asked what would be done to alleviate these problems, most of them felt that they would be grateful if the company gave them loans to help in the acquisition of more land and enable the diversification of crops. They were of the view that if farming methods were improved to using better techniques like use of fertilizers, better variety

seed, which would only be made possible by the company making prompt payments, this problem would be solved.

The food problem is further explained by the fact that the District as a whole has fairly poor soils. This needs rectification to bring about better yields per unit of land. This would be done by getting information from the extension staff reaching most people and other institutions of finance giving the farmers loans.

4.2 Role of Outgrowers

From the answers of the respondents, one can single out the role that outgrower farmers play by engaging in sugarcane production. First and foremost, they offer casual employment to the rural community during land preparations, weeding, and harvesting stages of production. When earnings come in lumpsum, more re-investments are done, plots are bought and developed, shops are rented, which entails offering more employment to the people as shop-attenders, and as casuals in construction work etc. This enables increased exchange of goods and services as peoples income are improved, meaning more demand and therefore more development of the rural commercial

areas. When farmers use sugarcane earnings to pay school fees for their children, they in a way try to eradicate illiteracy levels in the area. But a literate community is much better able to adopt new ideas and apply them, creating an atmosphere conducive for faster development than an illiterate community.

As a result of sugar-cane farming, some respondents had started practising dairy farming. Animals that were being kept before the introduction of sugarcane were indigenous cows (zebu type). 38.4% sheep (30.8%) and goats (31.5%). But now, the percentage of respondents keeping indigenous cows has reduced to 35.9%, sheep (30.0%) goats (23.1%). The reductions have been filled in by dairy farming, of which 10.3% of the respondents practised zero-grazing. This shows that land is now being used intensively than before when huge tracts of land lay fallow. This and the fact that livestock is also viewed as a form of wealth in the community (Shipton,1986) shows a further improvement in the standards of living.

From the survey data, the farmers role is better shown by the fact that all the cane milled is grown by either factory owned estates or outgrowers. The outgrowers are normally within the radial distance of

16-21 KM. hence they supply the bulk of the factory's requirements.

The major significance of the outgrower farmers to the sugar factory is underlined by the proportion of the total cane they supply to the factory relative to the nucleus estates. This is initially showed by hectarage under cane, cane harvested, and yields from the cane processed.

This is as shown below in table No.3 for a period of 10 years.

	NUCLEUS ESTATES	OUTGROWERS
1950	2835	7527
1951	3385	10634
1952	3787	11415
1953	3884	12112
1954	4115	13871
1955	4500	14470
1956	4837	11487
AVERAGE	3478.5	11042.9
PERCENTAGE CONTRIBUTION	28.2/2447	2677.118

Annual India Sugar Company/1958-

It has been noted that there is a significant contribution to the total cane supply of the company and the sugar industry, the 1958-59 season is not an exception. There is a significant contribution to the total cane supply of the company and the sugar industry, the 1958-59 season is not an exception. There is a significant contribution to the total cane supply of the company and the sugar industry, the 1958-59 season is not an exception.

Table No.3 Area Under Cane (Ha)

YEAR	NUCLEUS ESTATES	OUTGROWERS
1982	3306	6319
1983	3421	8907
1984	2658	7622
1985	3320	10834
1986	3757	14445
1987	3644	14673
1988	3510	13675
1989	3561	14032
1990	3570	13470
1991	3537	11457
AVERAGE	3428.4	11543.4
STANDARD DEVIATION	288.2447	2877.418

Source: Nzoia Sugar Company, 1992.

To find out whether there is a significant difference in the mean area under cane of the outgrowers and the nucleus estates, the T-test statistic is used. T-test is a test of significance applied to examine the difference between two sample means or proportions. In other words, it is a ratio between means. This statistic will help in determining whether outgrower farmers play a significant role in the production of sugarcane as compared to the nucleus estates.

The mean area under cane for outgrowers is

11543.4 ,while the mean area under cane for the nucleus estates is 3428.4. Therefore T-test at 0.05 significance level, and at 18 degrees of freedom is such that ;

T-test observed = 8.419

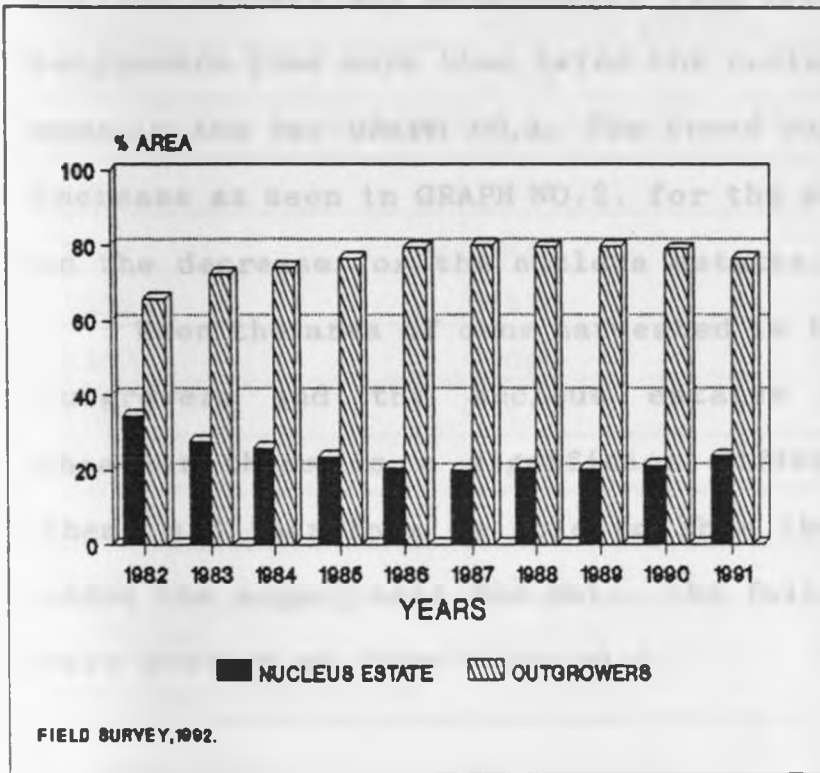
T-test expected = 1.734 , for one tail test.

Since T-test observed is greater than T-test expected, then the null hypothesis is inferred and the alternative hypothesis rejected. Therefore there is a significant difference between the mean area under cane and the mean area under the nucleus estates. Therefore the outgrower farmers play a significant role in the production of sugar cane as compared to the nucleus estates in terms of the area under cane, with the mean difference being 81150.0.

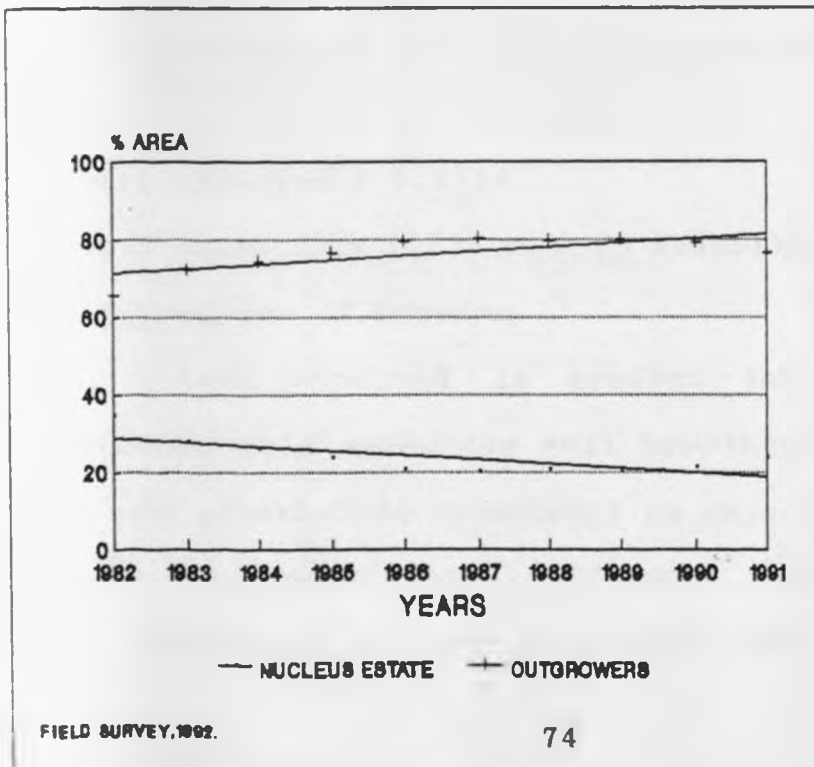
The difference in the mean area under cane can further be illustrated by use of graphics, thus bar graphs and trend lines. These graphics are as shown on the following page, on graph NO.1 and NO.2.



Graph No. 1 Area Under Cane



Graph No. 2 Area Under Cane



When area under cane in (HA) is compared between nucleus estates and outgrowers, from 1982 to 1991, the outgrowers grew more than twice the nucleus estates as seen in the bar GRAPH NO.1. The trend was also on the increase as seen in GRAPH NO.2. for the outgrowers and on the decrease for the nucleus estates.

When the area of cane harvested is tested for the outgrowers and the nucleus estates to find out whether there is a significant difference between them and therefore be able to show the sector that plays the significant the role, the following results were arrived at from table no.4

Table no.4 Area Harvested (HA)

YEAR	NUCLEUS ESTATES	OUTGROWERS
1982	1582	3482
1983	1914	1477
1984	1515	4059
1985	864	3509
1986	1372	2465
1987	1059	2235
1988	1749	2631
1989	1310	2913
1990	1134	2382
1991	1428	4418
AVERAGE	1392.7	2957.1
STANDARD DEVIATION	302.6242	855.6774

Source: Nzoia Sugar Company, 1992.

The mean area harvested for the outgrowers is 2957.1, while the mean area for the nucleus estates is 1392.7. (HA),

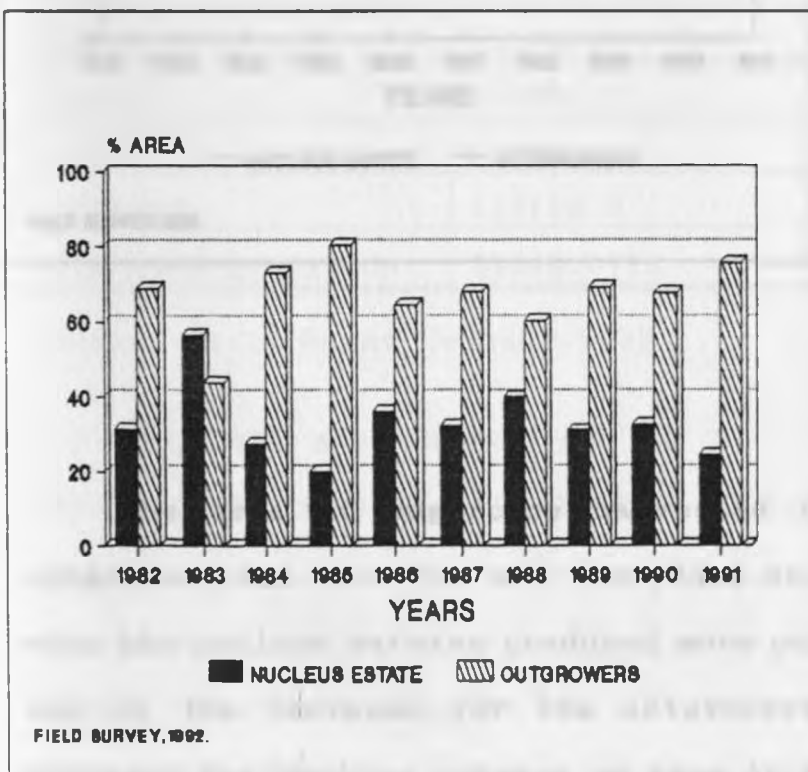
T-test observed = 5.1714

T-test expected = 1.734 at 0.05 significance level and at 18 degrees of freedom.

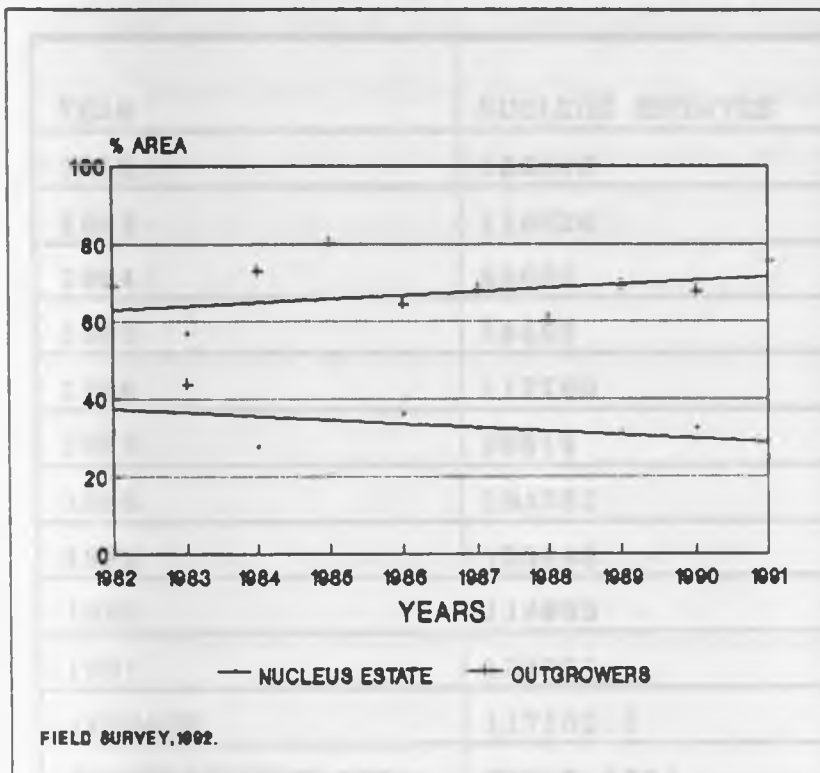
T-test observed is greater than the T-test expected. This means the null hypothesis is inferred and the alternative hypothesis is rejected. Therefore there is a significant difference between the mean area harvested of the outgrowers and that of the

nucleus estates. This therefore means that the outgrowers play a significant role in the production of sugar cane in terms of the area of cane harvested as compared to the nucleus estates. Graphically, the difference between the two means is as illustrated; on GRAPHS NO.3 and GRAPH NO.4

Graph No. 3 Area Harvested



Graph No.4 Area Harvested



The area of sugarcane harvested (HA) for the outgrowers was more for all the years except in 1983, when the nucleus estates produced more cane. The trend was on the increase for the outgrowers and on the decrease for nucleus estates as seen in the following GRAPH NO.4

When the amount of cane harvested in metric tonnes is tested the following results were arrived at.

Table No.5

Cane Harvested (MT)

YEAR	NUCLEUS ESTATES	OUTGROWERS
1982	126546	302970
1983	116626	94539
1984	85626	221993
1985	58455	248836
1986	117780	245178
1987	98814	268091
1988	184782	298091
1989	130448	366762
1990	114885	268864
1991	137061	369663
AVERAGE	117102.3	268498.7
STANDARD DEVIATION	31648.8711	74370.28997

Source: Nzoia Sugar Company, 1992.

The mean area harvested for the outgrowers is 268498.7 MT while it is 117102.3 MT for the nucleus estates. Using T-test statistic, the following results were arrived at;

T-test observed = 5.61994

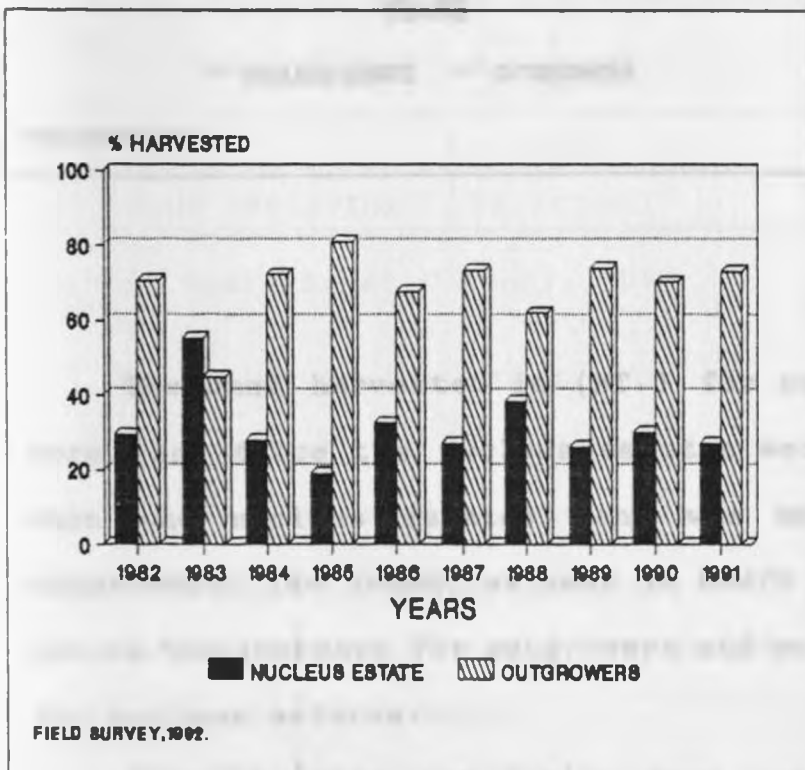
T-test expected = 1.734 at 0.05 significance level and at 18 degrees of freedom.

T-test observed is greater than T-test expected. The null hypothesis is inferred while the alternative hypothesis is rejected. There is therefore a

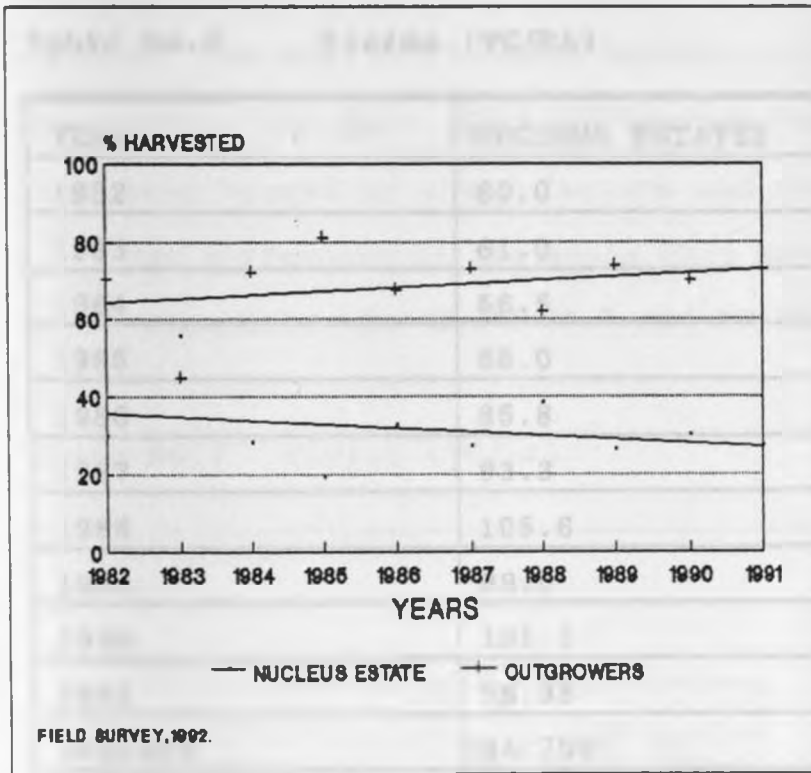
significant difference between the mean area harvested of the outgrowers and that of the nucleus estates. This therefore indicates that the outgrowers play a significant role in the production of sugar cane as compared to the nucleus estates.

Further graphical presentations to show the difference is as shown below, on GRAPH NO.5 AND GRAPH NO.6.

Graph No.5 Sugarcane Harvested (MT)



Graph No.6 Sugarcane Harvested (MT)



The cane harvested in (MT.) for outgrowers was more than twice the nucleus estates except in 1983, when the nucleus estates cane was more than the outgrowers. The trend, as seen in GRAPH NO.6 was on the increase for outgrowers and on the decrease for nucleus estates.

Finally, when the yields were tested to show whether there is a significant difference between the outgrowers and the nucleus estates the following

results were found from table no.6

Table No.6 Yields (TC/HA)

YEAR	NUCLEUS ESTATES	OUTGROWERS
1982	80.0	87.0
1983	61.0	64.0
1984	56.5	54.7
1985	68.0	71.0
1986	85.8	99.5
1987	93.3	120.0
1988	105.6	113.4
1989	99.6	125.9
1990	101.3	121.3
1991	95.98	83.67
AVERAGE	84.708	94.047
STANDARD DEVIATION	16.71734	24.4432

Source: Nzoia Sugar Company, 1992.

The mean yields (TC/HA) of the outgrowers is 94.047 while it is 84.708 (TC/HA) for the nucleus estates. T-test for the above data is as seen;

T-test observed = 0.946

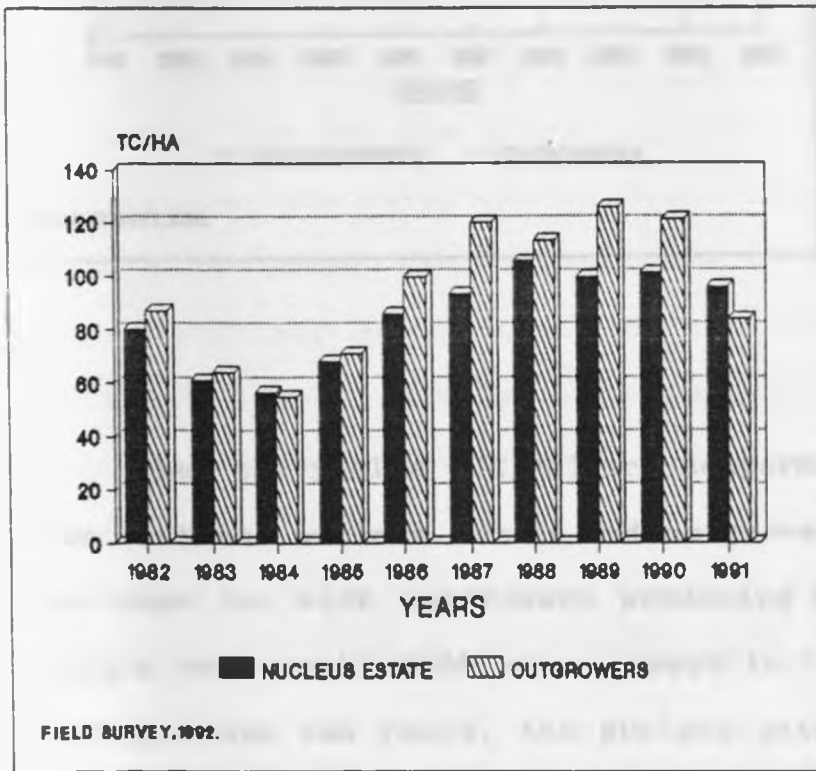
T-test expected = 1.734 at 0.05 significance level and at 18 degrees of freedom.

The T-test observed is less than the T-test expected. The null hypothesis is therefore rejected while the alternative hypothesis is accepted. There is

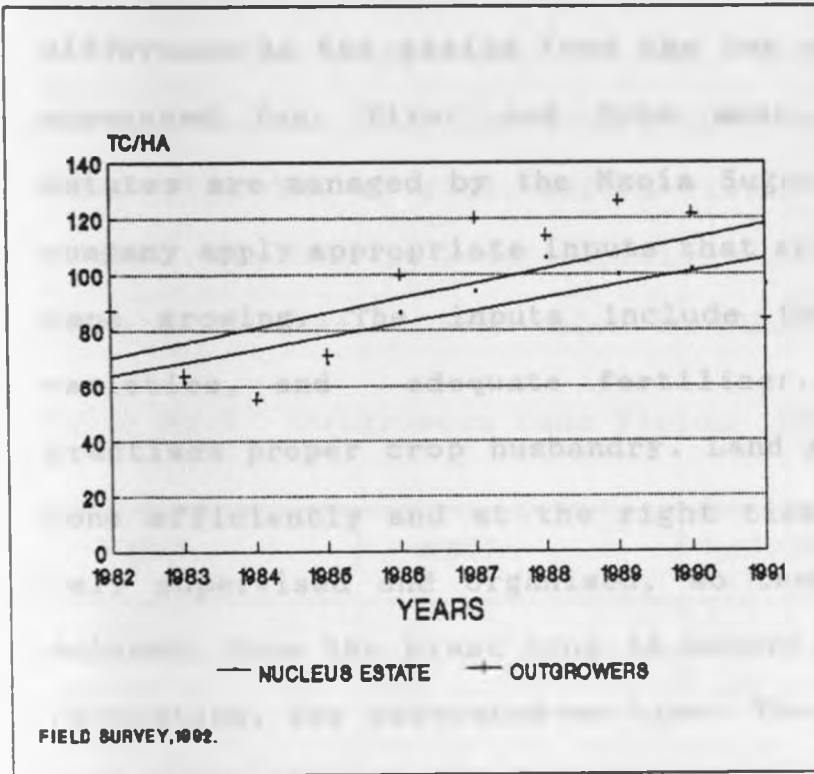
therefore no significant difference between the mean yields (TC/HA) of the outgrowers and that of the nucleus. The mean difference between the two sectors is 151396.4 (TC/HA). This difference therefore must have been caused by other factors and not by chance.

The difference in the means when seen graphically is as seen below in GRAPH NO.7 and GRAPH No.8.

Graph No.7 Yields (TC/HA)



Graph No.8 Yields (TC/HA)



When the yields (TC/HA) are compared, the yields for both the nucleus estate and outgrowers are almost the same but with outgrowers producing higher yields with a very small difference except in 1984 and 1991. During these two years, the nucleus estates produced higher yields than outgrowers.

On the other hand, the trend of yields of the outgrowers and nucleus estates are both on the increase with outgrowers trend increasing at a

slightly higher rate than the nucleus estates.

The factors that might have contributed to the difference in the yields from the two sectors can be accounted for. First and foremost, the nucleus estates are managed by the Nzoia Sugar Company. The company apply appropriate inputs that are required for cane growing. The inputs include the right seed varieties, and adequate fertilizer. The Company practises proper crop husbandry. Land preparation is done efficiently and at the right time. Planting is well supervised and organised, so that it is never delayed. Once the plant crop is mature and ready for harvesting, its harvested on time. The harvesting is done after proper crop maintenance of right weedings and fertilizer application. On the other hand, the outgrowers are usually small scale with limited capital to apply the optimal technology packages to sugar cane cultivation and maintenance. Other things being equal, therefore, the yields obtained by the outgrowers are usually lower than those of the nucleus estates.

The amount of cane supply is dependent on the land area that is put to cane cultivation and the productivity on the land thus set aside. Availability of sugarcane in sufficient quantities to meet and

sustain existing sugar factory capacity determines the success of the industry.

The outgrowers in Nzoia zone realised a gradual decline in yields from 132 (TC/HA) in 1980 to a low 55(TC/HA) in 1984, before rising to 120(TC/HA) in 1987. The nucleus estates yields were all above the national average as seen below in TABLE NO.7

Table No.7 Outgrowers Cane Yields 1980- 1988

YEAR	NZOIA	REGIONAL AVERAGE	NATIONAL AVERAGE
1980	131.8	145.2	100.0
1981	96.6	101.9	73.0
1982	87.0	74.2	63.0
1983	64.0	67.2	66.0
1984	54.7	74.8	68.0
1985	71.0	69.8	67.0
1986	99.5	77.8	68.0
1987	120.0	88.1	66.0
1988	113.4	97.5	84.2

Source: Nzoia sugar company, 1992.

Table No.8 Nucleus Estate Cane Yields 1980-88.

YEAR	NZOIA	REGIONAL AVERAGE	NATIONAL AVERAGE
1980	81.8	124.6	100.0
1981	74.0	87.8	73.0
1982	80.0	91.5	63.0
1983	61.0	76.9	66.0
1984	56.5	75.4	68.0
1985	68.0	78.2	67.0
1986	85.8	86.8	68.0
1987	93.3	93.7	66.0
1988	105.6	107.8	84.2

Source: Nzoia Sugar Company, 1992.

The nucleus yields of Nzoia have been above the national average. After declining, the yields have consistently been rising from 1985.

The reasons for variations are as below;

The Nzoia area has loamy light soils that require light tillage and has ample rainfall better distributed as explained in the study area. The factors which have caused variations among and within the zones of outgrowers and nucleus estates are as explained below.

Farm management;

Good crop husbandry and cultivation of high yielding varieties has generally contributed to better yields from 1984 to 1988. On the other hand poor crop maintenance is caused by lack of labour for weeding, and low income levels, which led to yields declining for outgrowers from 1981 to 1984.

The low rainfall of 1980 and 1984 led to depressed yields in 1981/82 and 1985.

Application of fertilizers to improve soil fertility has contributed to better cane yields from 1985 to 1988.

The yields were further affected by insufficient funds for cane development and maintenance as seen from the survey data, whereby majority of farmers earned less than ksh.2000 per month, and with an average family of eight members causing the money to be channelled to purchase of food than maintaining cane whose payments were further delayed.

The state of harvested cane has also contributed to low yields. The cane is harvested when its over-age, that is after three years when it is supposed to be harvested after 18 months. These delays reduced the yields with outgrowers yield falling from 125.9 in 1989 to 121.3 in 1990 and to 83.65 in 1991.

4.3 Problems Encountered by Outgrowers

During the growing period, the outgrower farmers are faced with some problems. These problems have hindered efficient production of sugarcane as outlined below:

4.3.1 Land Preparation

Soil conditions determine the type of land preparation for cane production. Nzoia area has light sandy soils, hence uses light machines. Ploughing, light and heavy harrowing, furrowing is done by use of light tractors ranging from 64-84 HP.

First harrowing is generally done by HP tractors. This is done to allow deeper ploughing so as to increase soil depth and improve drainage in areas where landpans have developed. The use of light tractors reduces chances of compacting the soil causing drainage problems.

From the household survey, land preparation is done by the factory tractor, but ox-plough and other farming implements are used where a farmer wants to cut down costs of production. The mode used affects the yields from the farms, which tend to be lower from the outgrower fields as compared to nucleus estates who use tractors that are more efficient in

land preparation. The tractor, though costly, is less time consuming, uses less labour and above all works more efficiently than the ox-plough.

4.3.2 Seed-Cane

Seed-cane is an input, and its quality and the quality of the planting operation determine the original strength of the crops, at the beginning of the growing cycle. It is therefore important that seedcane growth is exposed to careful husbandry practises and handling. The primary nursery seedcane need to be hot-water treated as a means of controlling Ratoon-Stunting Diseases (RSD) (KSA, 1989, 1990).

Field survey results show that the seedcane used during planting is that recommended by the company agronomist. But there were some farmers who complained that the seedcane supplied was not enough for the surveyed area. This was explained by the fact that acreage sizes were underestimated by the company surveyors. This forced the farmers to acquire seedcane from other sources not recommended by the agronomist. The effect of this act is reflected in reduced productivity of cane. This reduction is attributed to the increased incidence of diseases attached on the

latter seedcane.

Seedcane comes from the company nucleus estates. In case of acute shortage of seed cane from these estates, the agronomist and agricultural manager normally select good cane from outgrowers to be cut as seed cane. The transport of seedcane is done by factory fleets or contractors hired by the factory.

The survey results show that some seedcane was found being developed at the farmers plots. This made seeds readily available at a nearby Location. This is cost saving act in the operation of relatively high unit costs. This is because the seedcane transport charges are based on the distance of delivery and is equal to that of commercial cane.

Seedcane goes through the sample-weighing process. This requires that few loads of seedcane go to the factory weigh-bridge during a sale delivery. The buying farmer receives seedcane by weight, and this weight is established at the weighbridge. It wasn't unusual for seedcane to leave from different zones, and go to the factory weighbridge first. This was a problem to the farmers because it inflated the transport costs. A suggestion put forward was that of bundling the seedcane in stacks of equal volume and weighing only a sample of the numerous stacks at the

weigh-bridge. This would cut down on costs.

The quality of the seedcane was found to be good, though disease like smart were evident. This is explained by the fact the agronomist are not as fast in introducing new and better varieties of seedcane.

Apart from shortages in seed supply, delays was another problem raised by 21.9% of the respondents. The company supplied seed cane much later than expected. This affected the whole cycle of growth, which does better if strictly adhered to.

Materials for gap-filling are delivered as part of the planting seedcane, but weather and termites were cited by respondents to be playing havoc to gap filling.

4.3.3 Sugarcane Maintenance

This includes weed control measures and fertilizer application. Weeding of cane is a combination of hand weeding (60% of the respondents) while 40% of the respondents used oxen-interrow cultivation. The farmers undertook 5-6 weedings for plant crop and 3-4 weedings for ratoon crops. Problems encountered during weeding-time was scarcity of skilled labour. The nature of work was found to be harsh, and therefore resulted in labourers asking for

more money per line of cane than actual estimates. This infact resulted in the weeding process being so costly so as to avoid poor maturity of the crop.

From Kenya Sugar Authority estimates of costs of weeding, a farmer is supposed to incur KSh/ha = 8942. But from the field, respondents costs varied between 10,000 - 15,000 Ksh/ha.

Weeding and planting operations are done manually with a combination of hired and family labour. 35% of respondents used hired labour, while 45% used family labour. Family labour is less common because children go to school and are therefore unavailable for this operation. Hired labour was found to be reliable, where by 6-22 men are used to plant one hectare at a set rate of 730 ksh. (KSA, 1991.). This figure varies and becomes expensive when a farmer wanted planting to be done quickly.

Hired labour, though reliable was not easily available during festivity periods of circumcision times. It normally became scarce, and expensive. Some respondents cited the problem of negligence by the labourers if not strictly followed. This affected yields in the longrun as either the weeds were not properly removed or planting was not done the right way affecting growth of the crop. 19.7% of the

respondents cited the problem of hired labour as being too much demanding. Some needed food and other incentives so as to work the right way.

Fertilizer application rates and types are not uniform, but farmers are given Urea and DAP by the factory. The total cost on average was 7,233 KSH/KG/HA.

Time of fertilizer application, rainfall and number of weeding determine yields. According to (KSA, 1990) the maintenance costs in both plant and ratoon crops were in 1989 and 1990, 5,653 KSH/HA and 10,390 KSH/HA. respectively. This figure is higher and ranges from 10,000 KSH/HA. to 15,000 KSH/HA. respectively.

The supply of fertilizers to the farmers was found to be unsatisfactory by the respondents 35.7% of respondents cited the problem of delayed delivery. The fertilizers are brought when time is long past for application. Though the fertilizer was supplied, 21.9% of the respondents said that the quantities were inadequate. Only small portions of land under cane could be applied by fertilizers 27% of respondents were of the view that delivery of the fertilizer was biased. Only prominent and well known farmers were supplied the right quantities and at the right time.

15% of the respondents said that corruption was a problem that prevailed too. The suppliers wanted to be bribed before delivering the cane and other inputs. This is unfair to the farmers because in the end, the farmers are subtracted the cost of these fertilizers from their gross earnings.

4.3.4 Harvesting

Harvesting is labour intensive. Sugarcane cutting is totally non-mechanised. The company hires the cane cutters for the farmer from distant places. They are given a meal such as mixture of maize and beans as an incentive. From the field survey, it was found out that most cane cutters demanded for better quality food of ugali and meat which is too expensive for a poor peasant farmer to provide for all the cane cutters. If what they ask for is not given, 20% of the farmers interviewed said that the cane is not cut the right way. The cane was being cut quite up high the stem which is a waste of cane leading to loss of the actual tonnage of cane. 15% of the respondents cited abandonment of cane fields before all the cane is cut. This act resulted in part of the cane being taken to the factory while the remaining part was left on the fields to overmature as it awaited the next

harvest. The yields which depend on the age of cane during harvest time were affected.

Sugarcane handling operations follows the cutting process. Handling depends on whether the cane is burnt before harvesting or not, mode of loading for transport and factory administrative requirements.

Accidents and illegal cases of burnt cane do arise. It is cheaper to harvest burnt cane. But burnt cane is known to deteriorate fast especially in factories with a large time lag between burning and milling. It makes the harvest operation less tasking and less dangerous. But these reduces the amount of trash available for trash-lining and while the burning can be a fine hazard, some environmental degrading effects have been blamed on the burning of cane. It reduces trash, easing movement and handling of cane during harvesting.

Deterioration of cane starts immediately after cutting and therefore, storage time for cut cane should always be kept at a minimum. Cane deterioration is accelerated by high temperatures, light, loss of moisture and inversion of sucrose to glucose to fructose (KSA, 1990).

Therefore burning as a pre-harvest treatment makes cane to be very vulnerable to quality deterioration in

terms of weight loss, purity and quantity of sugar. When the quality of its juice deteriorates, the sucrose in the juice is progressively broken down by hydrolysis into glucose and fructose, both of which fail to crystallize during the subsequent factory process and are discharged finally into molasses.

4.3.5 Transport

Sugarcane transport is the single most expensive agricultural mechanization input in the sugar industry (KSA, Statistical Yearbook 1991). The sugarcane transportation forms an essential link between the farmer and the factory. The transport therefore requires both careful planning and research in order for it to be adequately understood.

Sugarcane transport efficiency is partly dependent on the quality of harvesting and the handling operations, which are in turn dependent on labour availability, and which is dependent on other factors like availability of housing for cane cutters, and whether its burnt or green sugarcane harvesting.

The company undertakes to transport the cane. From the respondents views, problems encountered were as follows: wastage of cane due to spillage, loss of weight due to delays, and the fact that transportation

was not done all at once.

Sugarcane transport is affected directly by nature of roads available, the prevailing weather, machinery types, and machinery and organisational management. For economically efficient cycle operation, the sugar cane transporter needs to have the right quality and quantity of machinery, as well as operational skills. The quantity determines the availability of machinery by numbers, while quality is dependent on the infrastructural support of the machinery, and the training or experience of operators.

But the roads in Webuye Division were in bad shape, and full of pot-holes. During rainy seasons they became impassable causing delays in delivery of cane to the factory and increasing spillage due to getting stuck in mud and potholes. The kind of machines used looked old and rusty, and showed high rates of breakages. The number of machines was found to be inadequate as this was evident by cane taking too long on the fields awaiting transport.

It was further noted that managerial or administrative capacity also affected output, for a given contractor. For example, where transport tractor operations are paid per tonne of cane

delivered, they will reduce spillage losses and cycle times. Too many tractors cause delay at the weigh bridge and cane yard. It was noted that a larger tractor travelling further covers a longer distance, carries a large load and consumes more or less the same amount of fuel (KSA, 1989).

Spillage is less when loading is done by grab-loaders. It is also dependent on the variety of sugarcane in question. The straight sugarcane varieties contributes less to spillage losses and straightness of cane is dependent on the age of the crop of harvest (Nzoia Sugar Factory Surveys).

From interviews with factory management, the roads are in bad shape due to shortages of funds to develop a comprehensive road maintenance unit at the factory level. Such factory controlled units are essential especially because the responsibility by the county councils has not been effective.

4.3.6 Extension Services

The Outgrower and Harvesting Departments monitor the sugarcane growing until harvesting, for instance, where weeding is irregular, the farmer is warned.

From the field survey, when respondents were asked whether they were visited by extension officers

or not, 72.5% said they were visited while 27.5% of the respondents were never visited. Of those that were visited, 75.0% were visited once a week, 15.5% twice a week and 9.5% were being visited once a month. This clearly shows the irregularity of extension staff in the delivery of their services. They use the train and visit approach.

The farmer's views on whether the extension staffs' visit were useful or not were such that 31.5% of the respondent's said they got better advice on how best to grow and maintain sugarcane. 57.4% of the respondents were of the view that the demonstrations they saw from the extension staff were a better approach to learning and practising, while 11.1% of the respondents claimed that problem areas were identified by the extension workers and solutions offered on how to tackle the problems.

Asked whether the respondents experienced any problems with the extension staff, 29.8% claimed they had, while 70.3% had not. The type of problems cited were, irregular visits by extension workers, language barriers between farmers and the extension workers, poor dissemination of ideas of the extension workers, and the complaint of lack of commitment on the part of the extension workers.

From policy outlines, transport acted as a barrier for the extension staff to travel far and wide so as to reach all the farmers. Furthermore, another constraint which prevailed was inadequate number of extension workers to serve all the farmers in the District.

Hence, extension work which should be backed by adequate training of extension workers themselves, machinery operators and other technicians need an incredible amount of rectification. This is because when properly done, these services will help safeguard the industry by ensuring that state-of-the-art innovations are introduced and sustained in the sugar industry.

It is the extension service and training that will motivate farmers to increase their productivity level. It will also help field workers have first hand information which will give them confidence in their duty of bridging the gap between farmers, salesmen and factory management. It will ensure that inputs are utilised in the recommended form. A well established extension service provides a base for both manufacturers and farmers to exchange knowledge which, with aid of researchers, helps improve product qualities and therefore yields.

4.3.7 Credit Facilities

Farmers in Webuye Division growing sugarcane are dependent solely on the credit facilities provided by the farmer established co-operative societies, or companies. A few well-off farmers may have other privately organised credit sources, which is dependent on their credit worthiness, e.g. Commercial banks.

The nature of sugarcane as a crop makes a long-term loan necessary. It is necessary that a loan received by sugarcane farmers requires payment to commence after a period of at least two years. It is only after this period of time that the farmer receives income from the crop. It is even worse when harvesting is delayed.

40% of the respondents had access to credit facilities, while 60.0% said they never had an access to credit. Of the 60% they cited the following reasons why they had no access to credit facilities. 9% of the respondents lacked security to acquire credit, and 1/3 of the respondents lacked the proper information base concerning credit acquisition. 45.6% of the respondents claimed that they had no access to credit because of the corruption and discrimination that was practised by the lending institutions. 15% of the respondents said they had no information concerning credit.

Nzoia sugar farmers have formed the Nzoia Outgrower Company (NOCO). This company is aimed at supplying inputs and extending credit facilities to outgrower farmers. It negotiates on behalf of the farmers with the sugar company. It is through this company that farmers opinions are expressed.

When respondents were asked how they utilised their credit advances, 24.3% of them used it to improve farming methods, 31.0% to re-invest in shops and plots, while 44.7% were of the view that they made renovations of existing facilities and saved some for interest earning as they awaited to undertake projects.

4.3.8 Factory Level Constraints

Farmers interviewed felt they were not adequately represented at the weighbridge. They suggested that there should be a minimum income to the farmer before presumptive income tax is charged. This was explained by the fact that a farmer waits for 48 months instead of 24 months before cane is harvested. Then, after taxation and interest recoveries, he ends up with discouraging incomes which come after one year and over.

The people at the weighbridge tend to sometimes

underweight farmers produce. This discourages farmers because it affects their actual payments of cane which normally depends on tonnage per acre. Strict supervision by the concerned people concerning the weights should be more strict. This was the view of the respondents, so that their interests are catered for.

Farmers also felt that the company should introduce a loan scheme programme for those farmers whose cane will overstay on the farm for more than 24 months. After this period, a farmer will apply for a loan and security will be the cane. This would ease fees problems in the area.

4.3.9 Payments

On financial payments, farmers said that the factory managers took more than two years to get their cane money. This is too long a time to be patient, and as such, meeting domestic obligations and maintaining young cane becomes very difficult. 33.9% of the respondents didn't mind about the payment system, while 66.1% were unsatisfied with the system, and said it was taking too long. This had an effect on the farmers because it had killed their morale on sugarcane growing. Some farmers even threatened to

abandon the cane fields and grow any other crop that would make them realise their earnings within a shorter time. In their view, they suggested there was need for the management to be more efficient and pay them promptly within 21 days after cane delivery to the factory.

This problem of sugarcane payments has become so acute such that in the Nation Paper, of Thursday 21st and Tuesday 26th January, 1993, articles appeared whereby farmers in Nzoia were owed 170 million Kenya shillings in arrears by the company. Infact the debt was about 200 million by end of last year, but 40 million shillings was given to the farmers as a campaign weapon. This is too unfair for the farmers who have a right to the money and not to woe them for their votes. Infact, in the article, the farmers had refused the factory from cutting their cane any-more.

The crushing capacity had gone down to 1200 TCD from 2000 TCD and the factory was getting cane from areas outside unauthorised areas.

4.3.10 Other Problems.

Other problems cited in the course of the study included complains from some farmers who had not been recruited as outgrowers. These farmers claimed there

was discrimination in recruitment. But this case is justified by the fact that people with land under disputes are not accepted, and land in marshy areas, is not allowed for sugarcane growing.

Delays in payment were also cited but argued on a different dimension. Some respondents felt that due to sheer hardwork, their parcels produced more yields than expected. The company on the other hand became suspicious of theft cases. This resulted in them going to resurvey their farmland again, and in so doing wasted their time and delayed their payments. This has effects on farmers who are likely to abandon their fields.

Cases of arsonists burning cane were also put up. Once cane had been burnt, the factory management sometimes refused to cut it on time. This caused further deterioration of sugar tonnage and affected yields and payments. But sometimes, the company dealt with such cases by giving them a condition that their earnings are delayed deliberately or have to pay something first. This is unfair because the fire is always accidental.

The factory management explained the financial problems in which they were in as emanating from the way the company was set up, with different firms

having shares in it. The factory depends mainly on loans and grants from the government, and therefore has nothing of their own to base on. The equipment they took over were overvalued and the foreign aid they got is overpriced and tied. Hence it's the original set up of the factory that limits their cash flow. Provision of funds is not often guaranteed, and where available, its never on-time.

When the factory management was asked how it coped with either overproduction or under production, these were cited. When there is more cane than needed, they try to reduce acreage under plant, and sometimes leave cane standing for 3-4 years without harvesting. This method affects yields which fall. Sometimes they talk to farmers to understand the effect of what is happening without cheating. Whenever possible, bilateral arrangements are made with sister companies who took the excess cane. But farmers are sometimes allowed to sell to private millers.

In all, the company tries to control production to fit requirements by planning five years ahead. This sometimes does not work because sugarcane is affected by weather of which man has no control over it. But there is poor planning generally in the

company. This planning was inherited from the foreigners whose contract ended, but had not planned ahead by then. This has been the root cause of most of the problems being experienced.

When there is under-production like it is the case now, the factory is producing below the expected capacity. But the factory is trying to use sources from other sister companies. But the only solution will be better planning by management and a bit of commitment of the directors to their work, so that politics does not infiltrate into the management of the factory.

In the end, when respondents were asked whether they found the contract with the Nzoia Sugar Company to be of value despite the above problems. 59 respondents said it was of value, while 21 respondents claimed it was of no value at all.

But when they were asked of what value the contract was, 52.3% claimed they got employment and therefore earned incomes, 32.7% said they benefited alot from inputs given plus the extension services which improved their art and skills of working which they applied to other areas. 14% said that from the contract, payments which were lumpsum made it possible to re-invest in shops and other activities improving

the commercial sector. Availability of credit facilities made further development possible, improving the general living standards. 1% of the respondents claimed that they were able to supply sugarcane to the factory which is processed into sugar to meet the domestic demand and surplus exported to earn foreign exchange. This made available savings and investments for further development. In fact 55.7% of the respondents preferred growing sugarcane compared to 44.3% who preferred food crops. But overall, both crops are necessary both for direct and indirect consumption. But the introduction of sugarcane had led to improvement of infrastructural facilities, social and economic life of the people and so farmers wished that everything should be done so that sugar factories are managed well to continue crushing cane.

CHAPTER FIVE: SUMMARY, PROPOSALS AND CONCLUSION

This Chapter deals with a summary of findings that emanated from the previous chapter. These findings are based on the study objectives, that is;

- a) The role that the outgrowers play in the production of sugarcane and
- b) The problems that hinder better production of sugar cane.
- c) The Chapter gives proposals targeted at solving the constraints identified. This include the diversification of crops and adoption of off-farm activities, and changing the land use practises of land subdivision to uneconomic parcels and so on.

The Chapter is thus organised in three sectors: Summary of Findings, proposals and Conclusion.

5.1 Summary of findings .

The problem that led to this study was the need to look at events in Webuye Division as they relate to sugarcane farming by outgrower farmers. The problems have hindered the achievement of the role that the agro-based industry was supposed to have played in the District during its setup. The sugarcane industry further hoped to hasten the improvement of agricultural practices especially from subsistence and

food crops farming to cash crop farming. This is as outlined in the first chapter, because the plan of expansion of sugar production to enable the country to become self-sufficient incorporated making sugarcane a small holder field crop.

There are an estimated number of 15,000 outgrower farmers supplying 83% of the total cane to Nzoia sugar factory, the balance coming from the nucleus estates. In terms of cultivated area, outgrower farms cover 87% of land devoted to cane.

The small-holder growers invariably have mixed enterprises. Typically, they have holdings of 2-5 Ha, and growing between 1 Ha. and 3 Ha. of cane, allocating the rest to livestock, crops like maize, beans, sunflower, vegetables.

Small scale farmers provide their own labour to perform relatively lighter tasks but demanding of planting, weeding, and fertilizer dressing. From the field findings, sugarcane farming is by its nature extremely costly in terms of finance. The land preparation costs were ranging from KSh.6,000 per acre to 10,000 per acre, for plant crop, and a bit lower for the ratoon. Harvesting and transportation costs would make total expenses to be higher per hectare; in range of 20,000 to 30,000 per hectare (KSA, 1991).

Sugarcane takes 18-24 months between planting or ratooning and harvesting. This time is beyond what a small farmer can provide from his own sources.

Farmers rely on sugar company for provision of inputs, extension services and credit. These are strapped with cash shortage such that even sometimes the companies have been unable to meet fully the farmer's needs. The inputs provided are inadequate, and where adequate, they are brought at the wrong time, i.e. delay in delivery. Extension staff are few in number to serve the whole division efficiently, and make irregular visits to farmers. There were cases of language barriers between some farmers and the extension workers, though their visits were found to be useful for farming and bringing in new ideas. Credit was a major problem to the small holder farmers. It was simply unavailable, though some cases of lack of security and lack of information concerning credit facilities featured.

Sugarcane maintenance including weeding and fertilizer application faced the problem of inadequate labour supply, making it costlier than the estimated rates. Furthermore, it was sometimes negligent and too demanding affecting final yields.

For harvesting, the sugar company hires labourers

and transports them from their homes to the farmers to cut cane, and then deduct the expenses from the farmers payments. Similarly, the company provides its own or contracts transport to bring the sugar to the factory. The problem of delay in harvesting was cited by all farmers. This affected yields, because they took more than 3 years to cut the cane. Apart from delays, the labourers were corrupt and needed incentives to work effectively. Cutting and loading cane is done manually, but it is an arduous, unpleasant job. Despite the enormous demand for wage employment, it has labour shortages, unless incentives are given like extra meals and housing.

Transport of cane had problems too. The road network itself was ineffective, and full of potholes. This refers to the feeder roads to the farms. In times of rains, they became impassable because of their state. The machines used are old and this allowed frequent breakages with the loaded cane. This caused spillage due to pushing and potholes, and delays which affected the tonnage at the weighbridge. The truck drivers seemed unexperienced in doing their work. The transportation of cane was never done at once, hence the affected cane was exposed to deterioration, and tonnages were low.

The farmers views were that they were not well represented at the factory level weighbridge. Some were suspicious that some of their cane tonnages were not realistically recorded. Other problems cited included food shortages due to sugarcane farming. Most farmer's total land was put under cane, at the expense of food crops, causing food shortages. Most of their incomes coming from farming was spend or purchasing food.

The most crucial problem was the delays in payments after delivery of cane to the mill. Farmers took up to two years before getting payments for the cane delivered. This killed morale of farmers who have opted to abandon their field without proper maintenance. As from february 1993, the farmers have refused the company from cutting their cane unless they pay them a debt of KSh. 170 million. This has caused a fall in the crushing capacity of the factory due to shortages of materials.

Minor problems cited by farmers but were not spread all over were discrimination in surveying land for outgrower farmers, suspicion on theft if yields are extra-ordinarily high, delays in payments, burning of sugarcane farms by arsonists, and refusal to cut burnt cane by the factory staff or fining the affected

farmers and in other cases delaying the cutting. This affected the final yields, affecting payments too.

Empirical evidence from this study indicated that the outgrower farmer played a significant role as compared to the nucleus estates in the provision of sugarcane to the sugar factory for processing. In terms of overall acreage under cane, area harvested, percentage harvested, and yields in metric tonnes, the outgrowers provided almost 80% of each. Hence, by providing cane for processing, they were trying to meet the domestic demand for sugar, saving foreign exchange that would have been used for importing sugar. In cases of surplus, sugar is exported earning the country foreign exchange.

At the farm level, there is employment created during land preparation, weeding, maintenance, harvesting and transport, to the local people but on casual basis. At factory level, more jobs are created, like the outgrower department that deals basically with outgrower farmers. When jobs are created, this means incomes are improved, leading to improved standards of living. In other cases, payments to the farmers which are often lumpsum enable farm improvements, re-investments in plots, shops etc. purchasing better quality goods and services leading

to overall increased demand for goods and services. This means more investments are done to meet the increased demand, and savings to earn interest. Overall, development is done of the rural areas as they gain better knowledge and are able to apply it to other fields from the extension staff. New ideas make the environment for development favourable coupled with improved infrastructural facilities to make possible the growing of sugarcane, by efficient transportation of inputs and harvest.

5.2 Proposals

This section gives a summary of proposals in thematical sequence, from problem-resolution approach, more salient approach and management approach.

5.2.1 Problem-Resolution Approach

In this approach, the following were resolved;

1. Farm Incomes.

Most of the farmers were earning very low incomes of less than KSh.2,000 per month from mainly farming and other non-farming activities. The main option for the small scale farmers in order to raise incomes is to adopt intensified agricultural techniques of production and engage in off-farm activities. This

would be possible with the help of the extension workers' advice. The off-farm activities would include the small scale activities.

2. Land use Practices.

The land use practices of the farmers should be changed so that the continuous sub-division of land to non-economic units would be discouraged. This is because continuous subdivision according to the number of sons creates small plots which are non-economical for agricultural production. This practise can be discouraged by the Ministry of Lands in conjunction with the Ministry of Agriculture and Health. These ministries would advice farmers on the importance of having small families and by providing the family planning facilities to the farmers. The Ministry of Lands can come in by setting policies stressing the minimum farm plot sizes permissible in cases of subdivision. While the Agricultural sector can help intensify their extension work by increasing the numbers of the extension staff in the Division.

3. Seed-cane procurement.

Better crop husbandry practises should be enhanced by extension staff and the researchers of the sugar industry, the Kenya Sugar Authority. This is because seedcane for use by the farmers is an input

whose quality and the quality of planting operation determine the original strength of the crop, at the beginning of the growing cycle. It is therefore important that seedcane growth is exposed to careful husbandry practices and handling. More efforts should be concentrated in selecting the right cane variety and have rigid control on varieties planted by the outgrowers. The researchers should be more active because the factory can collapse in the longrun due to poor cane variety selection. The Kenya Sugar Authority and Millers should regularly review existing cane varieties to establish a zonal policy on cane variety production.

4. Credit Facilities.

The Nzoia Outgrowers Company should be able to mobilize their credit facilities to all farmers without discrimination. Furthermore, the terms of lending should be less strict to the outgrower farmers and should accept cane to be used as security.

The sugar sector should organise a special longterm loan facility available to the sugarcane farmers. This will help solve their other problems which emanate from delayed payments of sugarcane and cooperatives should be widened in scope and open to all.

5. Extension Services.

A well established extension service provides a base for both manufacturer and farmer to exchange knowledge which, with the aid of researchers help improve products qualities. It also motivates farmers to increase their productivity level. Therefore efforts should be made by the Company and the Ministry of Agriculture to increase the number of extension staff. Furthermore, training should be extended so that the existing workers pass over their skills and innovations without problems emanating from communication and negative attitudes. The working should be strictly followed so that discrimination is curtailed. This means more funds should be injected to this extension service training. The Ministry of Agriculture in liason with Non-governmental Organizations together with willing private individuals can come in and form a common fund to train more extension workers.

6. Management

Because farmers attributed all their problems to management causing cane to become over-age, the management needs alot of rectification. Management can be influenced by both internal and external factors. Internal factors may be historical or current. For

instance the management they inherited from the expatriates which had problems of over-valued prices and tied aid. External factors can be the political environment, fiscal factors, credit availability to farmers, input prices and the prevailing socio-economic, technical and industrial conditions as seen in Chapter Four. These factors determine the individual factory's managerial capability etc. But the impact of these factors depend on the strength of the administration which determines the degree of vulnerability of a factory operating in a dynamic environment. A positive attitude enhances the strength of a company and team work contributes directly to company productivity.

Nzoia Sugar Company has established cane areas in blocks. This is recommendable because it would make field operations economic and the scheduling of harvesting and transport easier.

The Nzoia Outgrowers Company currently in operation should be mobilised. This will help in servicing the welfare of the farmers. This will go a long way in helping plan development strategies with the farmer in mind.

There were cases of suspicion by factory management causing delayed payments due to validity of

yield figures in line with possibility of stolen cane from neighbours. Such problems caused farmers a bit of dissatisfaction yet it would be solved easily administratively. Hence the administration should be able to act accordingly by choosing the right kind of people with the required skills.

7. Infrastructural Support.

The poor state of roads in the area affect transport of cane, inputs and movement of extension workers to reach all the farmers. This further affects the final yields. Therefore, efforts should be made by the Ministry of Transport and Communication through the Minor Roads Programme, so that the feeder roads are upgraded, while the murrum roads maintained well to easier movement in all seasons. Funds should be channelled to the transport sector by the government to build a comprehensive road maintenance unit at the factory level. This will supplement the efforts of the County Councils.

8. Crop Diversification

Agricultural diversification in sugar zones should be encouraged by the Nzoia sugar factory and supported by the government because sugarcane has no domestic food use and is usually not integrated with other farm enterprises. Farmers should grow

vegetables, cereals and legumes, and dairy farming to meet their own food requirements.

9. Payments

On financial payments, farmers took up to three years to get their cane money. This is too long and as such, meeting domestic obligations and young cane maintenance becomes very difficult. Farmers should therefore be paid promptly by the Nzoia Sugar Company within twenty one days of delivering cane. This can be possible if funds are made available by the factory staff and the concerned parties are instructed to strictly pay farmers as fast as possible in lumpsum.

Infact the company should compensate farmers incase of delays and be able to cut all cane whether burnt or not without discrimination.

5.2.2 Broad-based Approach

In this section, the following issues were considered;

1. Research of Sugar Industry

Empirical evidence showed that generally, research for efficient sugarcane and sugar production in Kenya is minimal and usually misdirected.

Sugarcane production requires institutional support of university research, Kenya Bureau of

Standards, Kenya Institute of Education, Government Ministries and special interest offices like those addressing communication aspects etc. Only by interaction of these groups of various supporting institutions will problems of sugarcane and sugar production ranging from land preparation, weeding, harvesting, transport to marketing be understood and a base for solving them established, e.g. a complete infrastructural support service.

Research helps in understanding the functioning system with projections in regard to changing trends and magnitudes of parameters influencing the system.

Sugar industry depends on Agronomic soil science, Agricultural engineering aspects and the political environment. Therefore all sugar companies require a highly trained and experienced staff (both managerial and technical) in the various disciplines.

Sugarcane is subjected to many possible sources of bottlenecks in a tied series of both field and factory operations. Therefore it requires a modern machinery of high level manpower and technological input. Because of this complexity, need for research in a wide range of disciplinary and speciality areas is important, e.g. an Agronomist needs to select a variety that will fit the industry not only socially,

by being economically viable, but also technically feasible with respect to the mechanisation and other inputs it requires (KSA, 1992).

2. Machinery and Replacement Policy.

The future of sugarcane production will rely heavily on mechanisation. Appropriate machinery for different climatic zones where sugarcane is produced should be identified, and machinery replacement policy for the industry should be evolved, such that the selection and replacement policy will be based on performance rates.

5.2.3 Management Approach

Under management approach, the following were considered;

1. Sugar Sector Management

Sugarcane growing and production is mainly controlled by the public sector. Control is through key actors, cane growers, millers, contractors and state corporations dealing with research, policy formulations, and marketing. But the sugar sector is responsible for a crop that is labour intensive, with high level of mechanization and other inputs. Therefore, success of industry is dependent on effective management both at farming, milling and

marketing level.

An evaluation of the chain of operations by Kenya Sugar Authority, from cane planting to sugar marketing needs a strong sector management. The lack of national level management input has greatly weakened the performance of the sugar industry. Kenya sugar authority established to render an effective an efficient management of sugar lack the necessary powers and authority to play the roles of co-ordinators, overseer and controller;

Role of Co-ordinator

The previous, current and future status of the sugar industry must be understood. This can be through research that will bring together all the key factors: farmers, contractors, millers, labour supply organisations, machinery dealers, researchers etc for the purpose of discussing means and ways of improving the industry. Therefore, Kenya Sugar Authority must carry out numerous studies, control research and have a say on costs and types of inputs, and on the selection of top factory management teams.

Role of Price Controller and Sales Promoter

The sugar industry needs a continuous financial flow for better infrastructural support, self-financing of cane development, rehabilitation and expansion

programmes. This is to reduce dependence on expensive foreign aid and other inputs like machinery.

The sugar equalization fund is a possible source of financing, but then the responsibility for administration of such funds should be vested in Kenya Sugar Authority.

Role of Educator

Kenya Sugar Authority can organise seminars for factory staff in different disciplines and at different levels of seniority or academic competence. The utilisation of research experts, staff from institutions of higher learning, machinery specialists dealers, manufactures, and agents for various inputs would make the exercise representative and manageable.

Role of Regulator

The sugar sector should be able to carry out specific information generating studies to be able to standardize the industry by region and input types, e.g. to burn or not to burn cane, stacked or non stacked transportation of cane, mechanical or manual harvesting, type of extension services and by who.

Role of Reviewer

Industry is extremely dynamic and is heavily affected by effects of exogenous and endogenous factors. These factors necessitate frequent reviews

of the status of the industrial subsystems, by the Kenya Sugar Authority.

Pricing of cane can be made by the factory staff according to cane quality, that is the sucrose content at the time of delivery at the factory gate, and not the existing, total cane tonnage per hectare (TC/HA). This approach is better because it rewards those farmers who have cared for their cane and punishes those who have not maintained their cane using recommended cultural practices. The weakness is that this approach is based on sampling.

2. For the above proposals to materialise there is need for a *Sugar Development Fund* which is sort of a revolving fund. Money accumulated in this fund by farmers, transporters, millers and consumers could be used to rehabilitate the presently old agricultural machines, and roads instead of importing sugar when cane is drying in the fields locally due to inaccessibility. The sugar industry in its present situation is in serious need for money for the following:

- Payments for the outgrower farmers,
- Development and maintenance of sugarcane roads,
- Development of outgrowers credit schemes,
- Training and development of manpower,

- Research and development within industry,
- Rehabilitation, expansion and modernisation of the factory.

If all parties concerned i.e. (farmers, transporters, millers) contribute as cost sharing for development and future stability of the industry, excise duty contributions and consumer contributions, the fund would be able to take care of the above developments paving way for the efficient production of sugar cane.

3. A change in policies is apparent if participation of lowest income group is to be ensured. Examination of the country's existing sectoral policies and plans as well as indigenous institutions available for rural development, has to be oriented explicitly to assessing the extent to which these effectively reach the lowest income or rural population. This will allow explicit recognition of the existing government policies which are inconsistent with the goals of rural development.

5.3 Conclusion

In conclusion, focus in Agricultural development and Agro-based industrial development in rural areas is important in solving problems of employment, low income levels, lack of basic services, inequalities in areas' development and standards of living.

From the above stated proposals, the problem-resolution approach should be given priority before the other options are implemented. This means that the problems that are facing outgrower farmers during the production of sugarcane should be solved first before broad-based problems are tackled. The problems like lack of credit facilities, inadequate extension services, and inadequate and delayed delivery of inputs and payments, should be solved first.

The management approach can then be given the second priority. This is because it is the management of any enterprise that will determine its failure or success. For this case, a change in the management system of the sugar sector should be wholly privatised to ensure some sort of efficiency in management. This is because public influence in the management causes more problems because of managers meeting their own interests at the expense of the public.

Overall, the broad-based approach can then be

adopted after the problems facing farmers have been solved and the management changed to a more efficient one. This approach will come in to enhance the efficiency of the production system. This refers particularly to the research of the sugar sector on a broader context.

Policy should be changed so as to include the low levels of farmers into the decision making process. This will strengthen the contribution of the farmers to overall development. But there is need for the establishment of a comprehensive and integrated planning system in the sugar sector.

BIBLIOGRAPHY

- Akungo, B.D.O. (1980) : "Constraints to Agricultural Development and Their Implications to Rural Planning: A case study of Mbita Division, South Nyanza District, Kenya". M.A Thesis, University of Nairobi.
- Awour, R.O. (1979): "Relationships of Kisumu Industrial Sector to the Resource Hinterland. A case study of Kisumu Cotton Mills". Unpublished M.A. Thesis, University of Nairobi.
- Barclay, A.H. (1965): "The Mumias Sugar Project, a study of Rural Development in Western Kenya". Unpublished Ph.D Thesis, University of Nairobi.
- Bauer, P.T. (1971) : Dissent on Development : Studies and Debates in Development

Economics. Weidenfield and
Nicolson, London.

Bigsten,A. and Collier, P. (1980) : "Education,
Innovation and Income in Rural
Kenya", Institute Of
Development Studies, Working
Paper No. 369, University of
Nairobi.

Clayton,E.(1983) : Agriculture, Poverty and Freedom in
Developing Countries. Mac Millan
Press.

Collier,P. and Lal,D. (1980): Poverty and Growth in
Kenya,World Bank Staff Working
Paper No.389.

Cox,P.M.J. (1984) : "Implementing Agricultural
Development Policy in Kenya",In
Food Research Institute Studies,
Vol.19.

De Wilde,J. (1967): Experience with Agricultural

Development in Tropical
Africa.Vol.1, John Hopkins Press,
Baltimore.

Frank,C.R. (1965): The Sugar Industry in East
Africa; Analysis of the expansion
of Sugar industry in developing
economies,East African Publishing
House,Nairobi.

Gyllstuan,B. (1977): The Organization Of Production As
a Space Modelling Mechanism in
Under-developing Countries; A Case
Study of Tea Priduction in Kenya.
Lund;Sweden Liber Laromedd.

Harbison,F.H. (1966):" The Generation of Employment in
newly Developing Centres",in
Conferance of Education,Employment
and Rural Development. Kericho,
E.A.P.H. Nairobi.

Hermes,M. (1982): An Introduction to Farming

Systems, Longman.

Hirschmann, A.O. (1972): Employment, Incomes and Equality; A Strategy for increasing productive employment in Kenya, Part 1, section 1,2,3. on Rural Employment Problems, Geneva.

Jaetzold, R. and Schidt, H. (1982): Farm Management Handbook, Western Kenya. Ministry of Agriculture. Vol.2,

Jabando, P.L. (1987): "The Role of Agro-based firms in Urban Development; Case Study of Sony Sugar Factory at Awendo Town". Unpublished M.A Thesis, U.O.N.

Kitana, T.M. (1972): "Cane Sugar and its Industry in Kenya: The Manufacturer of Cane Sugar, a Sugar Industry". Unpublished M.Arch. Thesis, U.O.N.

Khaguli, H. (1981): "The Impact of Mumias Sugar Factory

- on the Growth of Mumias Township".
Unpublished M.A Thesis,U.O.N.
- Kenya Sugar Authority, (1990):" Analysis Of Sugarcane
and Sugar Production Costs For
Kenyan Sugar Industries".
-----,(1979-88,1988-1991): "Year Book
Of Sugar Statistics".
- Lanting,H. (1977): Land Utilization Types in Kisii
District: A Preliminary
Study". Preliminary Report No.15.
- Makanda,D.W. (1987) : "Managing Kenya's Agricultural
Sector to the year 2000 and
beyond", Paper Presented at
Kenya Economic association
Workshop,September 1987.
- Masinde,A.K (1988): "The Impact of Nzoia Sugar Factory
on the Socio-Economic Development
of Kanduyi Division". B.A.
Dissertation,U.O.N.

Mallorie, E. (1986): Appraisal of Small-scale Sugar
Production in Kenya.

Mwandihi, L.A. (1985): "Rural Industrialization and Food
Problems; A case Study of Mumias
Sugar Scheme", Unpublished
M.A. Thesis, U.O.N.

Obara, D.A. (1983). " Environmental and Agronomic
Factors Influencing Variations in
Small-holder Cotton Yields in Kano
Plains, Kisumu District". Ph.D
Thesis. University of Nairobi.

Odada, J.E.O. (1979): "The Role of Sugar Industry in
Kenya; A case Study of L. Victoria
Basin", U.O.N.

Obiero, J.C.A. (1980): "The Western Kenya Sugar
Industry with specific reference to
Nyanza and Western Provinces".
Unpublished M.A Thesis, U.O.N.

Republic of Kenya: Economic Management for Renewed
Growth; Sessional Paper No.1 of
1986.

-----: Development Plans (1966-70, 1970-
74, 1974-79, 1980-84, 1984-88,
1989-93).

-----: African Socialism and it's
Implications in Planning.
Sessional Paper No.10 1965.

Shipton,P.(1986): "The Public Creation of Private
Property: The Uses and
Misunderstanding in the Kenyan Land
Tenure Reforms". Harvard University
Workshop on Land Issues in Africa.
March 1986.

Staudt,K.A. (1982): "Women Farmers and Inequities in
Agricultural Services" in Bay,
E.G.(ed), Women and Work in
Africa. West-view Press.

Southworth, H.M. and Johnston,B.F (1967): Agricultural
Development and Economic Growth,

Cornell University Press.

Thorbecke, E. (ed) (1969): The Role of Agriculture in Economic Development. National Bureau of Economic Research, New York.

APPENDIX

QUESTIONNAIRE TO OUTGROWER FARMERS.

QUESTIONNAIRE NUMBER-----

DATE OF INTERVIEW-----

PLACE-----

NAME-----

Sex: Male----- Female-----

1. What is your age -----
2. Are you married? 1. Yes--- 2.No---
3. If yes, what is the size of your family-----
4. What is the level of your education?
 - 1.Primary-----
 - 2.Secondary-----
 - 3.College-----
 - 4.None-----
5. How many children in your family attend the following schools?

Levels	Number
Primary	_____
Secondary	_____
College	_____
6. What is your occupation?
 - 1.Wage employment-----
 - 2.Farmer-----
 - 3.Businessman-----
 - 4.Others specify-----
7. What is your level of income?
 - 1.0-1000.
 - 2.1001-2000.
 - 3.3000 and above.
8. What is the size of your farm?-----
9. How much land is under sugarcane now ha.---
10. How much land was under cane initially?---
11. What crops did you used to grow?
 - 1.-----
 - 2.-----
 - 3.-----
 - 4.-----
 - 5.-----
12. What crops do you grow now?
 - 1.-----
 - 2.-----
 - 3.-----
 - 4.-----
 - 5.-----
13. What animals do you keep?
 - 1.now---
 - 2.Initially---