

**INFLUENCE OF SUGAR FACTORIES ON IMPROVEMENT OF CANE
FARMERS LIVELIHOOD IN KENYA. A CASE OF BUNGOMA EAST**

SUB COUNTY

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DECLARATION

This research project report is my original work and has never been presented for any examination in any university for academic award.

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This research project has been submitted for examination with my approval as the University Supervisor

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DEDICATION

I dedicate this project to my dear Roby and my dear wife for giving me another chance to live through organ donation and support respectively.

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TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENT.....	v
LIST OF FIGURES	xi
LIST OF TABLES	xii
LIST OF ABBREVIATIONS AND ACRONYMS.....	xiv
ABSTRACT.....	xv
CHAPTER ONE:	
INTRODUCTION.....	1
1.1 Background of the study.....	1
1.2 Statement of the problem.....	4
1.3 Purpose of the study.....	5
1.4 Research objectives	5
1.5 Research questions.....	5
1.6 Significance of the study.....	5
1.7 Limitation of the study	6
1.8 Basic assumptions of the study	6
1.9 Delimitation of the study	7
1.10 Definitions of significant terms used in the study.....	7
1.11 Organization of the study.....	8

CHAPTER TWO: LITERATURE REVIEW.....	9
2.1 Introduction.....	9
2.2 Improvement of Farmers Livelihood	9
2.3 Income from cane delivered and improvement of farmers’ livelihood	11
2.4 Influence on education and improvement of cane farmers’ livelihood.....	14
2.5 Influence on food security and improvement of Cane farmers’ livelihood	19
2.6 Influence of sugar factories input on improvement of farmers’ livelihood.....	22
2.7 Theoretical Framework.....	26
2.8 Conceptual Framework.....	26
2.9 Summary of Literature Review.	28
CHAPTER THREE: RESEARCH METHODOLOGY.....	29
3.1 Introduction	29
3.2 Research design.....	29
3.3 Target population	29
3.4 Sample size and Sampling procedure.....	30
3.4.1 Sample size	30
3.4.2 Sampling procedure.....	30
3.5 Data Collection Instruments.....	31
3.5.1 Pilot study.....	32
3.5.2 Validity of the instruments.....	32
3.5.3 Reliability of the instruments.....	32
3.6 Data Collection Procedure	33

3.7 Data Analysis Techniques	33
3.8 Ethical Consideration.....	34
3.9 Operational definition of variables	34

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSIONS

4.1 Introduction.....	36
4.2 Questionnaire Return Rate	36
4.3 Demographic Characteristics of Respondents.....	37
4.3.1 Distribution of Respondents by gender.....	37
4.3.2 Distribution of Respondents by age	38
4.3.3 Respondents by education level	39
4.4 Income from cane supplied to sugar factories and improvement Of cane farmers' livelihood	39
4.4.1 Income earned by farmers' from cane harvested	39
4.4.3 Duration of cane payment after delivery to millers.....	41
4.4.5 Rating of the importance of sugarcane income.....	42
4.4.6 Main source of the income of the family.....	43
4.4.7 Pricing formula of the cane supplied to the sugar factories.....	44
4.5 The influence of Sugar factories practices on education improvement of cane farmers' livelihood.....	45
4.5.1 School Attendance.....	45
4.5.2 Affordability of Education	47
4.5.3 Enrollment in schools in the region	48

4.5.4 Barriers to School Enrolment	49
4.5.5 Role of sugar factories in improving infrastructure development in schools.....	50
4.5.6 Facilities repaired/maintained by sugar factories to Enhance Teaching/Learning in the Schools.....	52
4.5.7 Items Donated by sugar factories to Enhance Teaching/Learning in the Schools.....	53
4.6 Sugar factories influence on improvement of food security as a livelihood Enhancement of sugarcane farmers.....	54
4.6.1 Respondents’ overall farm size.....	54
4.6.2 Management advice to farmers’ to leave a third of total land area for food crop production.....	57
4.6.3 Effect of sugarcane management on food availability	58
4.6.4 Ways through which sugar factories’ management has contributed towards achieving food security to farmers.....	59
4.6.4.1 Sugar factories addressing food security by education the farmers.....	59
4.6.4.2 Addressing food insecurity on providing dairy animals.....	60
4.6.5 The source of food to sugar cane farmers.....	61
4.7Influence of Sugar factories input in improvement of Livelihood of cane farmers	62
4.7.1 Infrastructure improvement.....	63
4.7.1.1 Improving road network in the region.....	63
4.7.1.2 Access to information in relation to sugar factories.....	63

4.7.1.3 Source of water/provision.....	64
4.7.1.4 Material that used of residence of the sugarcane farmers.....	65
4.7.2 Extension services by sugar factories.....	66
4.7.2.1 Operations as advised by factories staff.....	66
4.7.2.2 Appropriate extension method of improving cane production.....	68
4.7.2.3 Level of technology adoption by farmers.....	69
4.7.3 Agricultural inputs.....	69
4.7.3.1 Cane transportation to sugar factories.....	70
4.7.3.2 Supply of cane seed for planting.....	70
4.7.3.3 Supply of fertilizer.....	71
4.7.3.4 Quality of land preparation.....	72
4.7.4 Environmental initiative by sugar factories.....	73
4.7.4.1 Factories role in conserving the environment.....	73
4.7.4.2 Diversifications with agroforestry to curb environmental degradation.....	74

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATION

5.1 Introduction.....	76
5.2 Summary of Findings.....	76
5.3 Conclusion.....	78
5.4 Recommendations.....	80
5.6 Suggestions for Further Research.....	81
REFERENCES.....	82

APPENDICES.....	87
Appendix I: Letter of Transmittal	87
Appendix II: Questionnaire.....	88
Appendix III: Table of Sample Size Selection.....	99
Appendix V: Work Plan	100
Appendix VI Letter of authorization.....	101

LIST OF FIGURES

Figure	Page
Figure 2.1 - Conceptual framework.....	27

LIST OF TABLES

Table	Page
Table 3.1 Selecting sample size.....	31
Table 3.2 Operational Definition of Variables.....	35
Table 4.2 Questionnaire return rate	36
Table 4.2 Gender.....	37
Table 4.3 Age.....	38
Table 4.4 Education level	39
Table 4.5 Income earned by farmers' from cane harvested.....	40
Table 4.7 Duration of cane proceeds payment after harvesting.....	41
Table 4.9 Importance of sugarcane income.....	42
Table 4.10 Main source of the income of the family.....	43
Table 4.11 Pricing formula of the cane supplied to the sugar factories.....	44
Table 4.12 Children at risk of dropping out of school due to Lack of school fees.....	45
Table 4.13 Child/Children at risk of dropping out of school and rating of the level Of satisfaction on what is offered by the sugar factories.....	46
Table 4.14 Rating on affordability of education	47
Table 4.15 Children who attend school.....	48
Table 4.16 Barriers to School Enrolment.....	50
Table 4.17 Infrastructure improvement in schools.....	50
Table 4.18 Facilities repaired by the Companies.....	52
Table 4.19 Donations by the Companies' to Schools.....	53

Table 4.20 Overall farm size.....	54
Table 4.21 Acres under sugarcane per individual farmer.....	55
Table 4.22 Acres under food crops per individual farmer.....	56
Table 4.23 Advice to leave a third of land for food crop production	57
Table 4.24 Effect of sugarcane management on food availability.....	58
Table 4.25 Addressing food security by education.....	59
Table 4.26 Sugar factories addressing food insecurity on providing dairy animals.....	60
Table 4.27 Addressing food insecurity by providing maize/bean seeds.....	61
Table 4.28 Source of food to the sugar cane farmers.....	62
Table 4.29 improvement of road network.....	63
Table 4.30 Access to information.....	64
Table 4.31 Source of water/ provision	65
Table 4.32 Material used of residence.....	66
Table 4.33 operations as advised by extension officers.....	67
Table 4.34 Appropriate extension method.....	68
Table 4.35 Adoption of new technology.....	69
Table 4.36 Transportation to factories.....	70
Table 4.37 Supply of cane seeds.....	71
Table 4.38 supply of fertilizer.....	71
Table 4.39 Land preparation.....	72
Table 4.40 Environmental conservation.....	73

Table 4.41 Agroforestry to curb degradation.....74

LIST OF ABBREVIATIONS AND ACRONYMS

AEOs	Agriculture Extension Officers
BUSCO	Butali Sugar Company
CBS	Central Bureau of Statistics
EPZ	Export Processing Zones
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IEA	Institute of Economic Affairs
KACC	Kenya Anti-Corruption Commission
KSI	Kenya Sugar Industry
KSREF	Kenya Sugar Research Foundation
LDCs	Less Developed Countries
NIE	Newly Industrialized Economy
NZUCO	Nzoia Sugar Company
OECD	Organization for Economic Cooperation and Development
SL	Sustainable Livelihood
SUCAM	Sugar Campaign for Change
UN	United Nations
US	United States
USDA	United States Department of Agriculture
WEKSCO	West Kenya Sugar Company

ABSTRACT

Sugarcane farming is an essential activity in the whole world because of the major product it provides, that is, sugar. Sugar, which is got from processing sugarcane mills, is planted by mainly farmers who deliver it to the processing factory after maturity. Sugar factories are critical in uplifting the living standards of the people as well as generating rapid economic growth through provision of healthcare services and education facilities, social and community services as well as support to sports in rural areas in the sugar growing zones. The purpose of this study was to investigate the influence of sugar factories on the improvement of cane farmers' livelihood in Bungoma East Sub County. This study was guided by the following objectives: to establish how the income from cane supplied to sugar factories influence improvement of the livelihood of the cane farmers' livelihood, second was to examine how the Sugar factories influence education improvement of cane farmers' livelihood, third was to assess how the Sugar factories influence the improvement of food as a livelihood enhancement of sugarcane farmers and lastly was to determine how the sugar factories input influence the improvement of livelihood of sugarcane farmers. The study adopted the descriptive survey research design to assess the influence of sugar factories on livelihood of farmers. The target population was 9550 cane farmers and 10 AEOs hence a total of 9560. The sample for this study was 370. The sampling technique used was stratified sampling where farmers were grouped into locations and randomly selected. The research instruments used in this study for data collection were questionnaire for the farmers and AEOs. Data analysis used frequency tables and percentages to analyze both quantitative and qualitative data. The element of reliability of the measuring instruments was determined using the test re-test method. Statistical Package of Social Sciences (SPSS) was used to classify and analyze the data that was collected. It came out from the study that farmers could get some income whenever their cane was harvested and delivered to the sugar factories and the income depended on the acreage of the land. The income accomplished many tasks in the family like paying school fees. It was also found that education status in the study area had improved, as whole generation of children had been enrolled in different schools. Sugarcane production had negative impact on food production to most of the households. Also it came out that the sugar factories management didn't provide dairy animals and maize/beans in addressing food security so as to cushion farmers. Lastly factories influence on inputs seen infrastructural development like of 59.1% of respondents were in agreement that roads had improved. The construction and development of roads and communication networks had enhanced the proper and fast marketing of farm produce. On access to information 66.7% of head of households agreed that they had full access and full satisfaction with reliability of information. Recommendations for further research werethe influence of the rising cost of energy on sugarcane farming, alternative modern farming methods that would integrate cane farming and food production to ensure food security and factors that led to the collapse of out growers' cooperative societies that championed the plights of farmers'.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Sugarcane farming is a worldwide activity, practiced in most countries in the world. The Sugar industries globally have had effects on the livelihood of the farmers in that it is credited for social economic boost to communities around major production centers' through provision of healthcare and education facilities, training, drainage and irrigation, social and community services as well as support to sports in rural districts. Sugarcane growing has helped smallholder farmers to improve their household incomes, educate their children, and expand their farms to engage in other enterprises like: vegetable and poultry production, (Sserunkuma2007). United States has both large and well developed sugarcane industries. According to Baucum, L.E. and Rice, (2008), sugarcane in the United States of America, is grown mainly in Florida, Louisiana, Hawaii and Texas. Florida contributed an estimated 48 percent of the cane sugar produced in the United States (US) the year 2007-2008. Cash receipts for the U.S.A sugar growers vary with sugar yields and prices. On average the sugar crops accounts for 1% of the cash receipts received by the U.S.A farmers for all agriculture commodities. The sugar prices have been well above world prices since 1982 because the U.S government supports domestic sugar prices through loans and marketing allotment, (USDA 2015).

The sugarcane industry represents an important segment of the Brazilian economy. In 2012, the sugarcane sector contributed US\$43.8 billion to the country's gross domestic product (GDP) equivalent to almost 2% of the entire Brazilian economy, (Baer, 2008).The sugarcane sector in Brazil employs 1.09 million workers. Salaries from sugarcane industry workers are among the highest in Brazil agriculture sector (Ministry of Labor and employment annual report). During the past 30 years, Brazil became the major producer of sugarcane and today it accounts for about one third of the world's product. It is also the most efficient in sugar production. Brazilian sugar cane based complex has three major product lines namely sugar, bio ethanol and bio electricity. It is the largest exporter of bio ethanol, (Kimera, 2005).

In Egypt Sugarcane is cultivated mainly in Upper and to some extent in Middle Egypt. Climatic conditions and soils in Southern Egypt are conducive to highly productive cultivation. Main production areas for sugarcane are Menya, Sohag, Qena, and Aswan where sugarcane processing plants (eight factories) are located. These governorates contributed 95.3% of total sugarcane production in the country for 1996, from 94.2% of total sugarcane area. Farmers indicate a strong preference to grow cane, since it requires less intensive farm management than the other traditional field crops or vegetables grown in Upper Egypt. Furthermore, marketing of cane possess minimal problems for cane farmers. Farmers in these regions however prefer to cultivate sugarcane in their rotation because it has a comparative economic advantage over other rotations. Sugarcane is the most profitable crop in these regions, taken into account that farmers cultivate onion, garlic, fababean or tomatoes as an inter-cropping, (John Keith, 1998).

According to Tarimo (1998) Sugarcane is one of the important food and commercial crops of Tanzania. Its production is concentrated mainly in three regions, Morogoro, Kagera and Kilimanjaro. Most of the sugar produced in the country is for home consumption and only a small proportion is exported to service foreign debts. More farmers have entered into the contract grower system of the sugar factories due to better prices of cane. Increased number of contract growers of sugarcane has greatly contributed to the observed increase in production of processed sugar during the 1990's in all factories. The out grower schemes in Tanzania date back to the early 1960s at Kilombero and Mtibwa sugar estates in the Morogoro region. The Out grower schemes in the respective areas have played a crucial role and impacted positively on communities and national economy as in providing employment, social development, and infrastructure roll out plus diversification in activities in respective areas. Women and housewives are predominantly engaged in the activities, thus has provided them with additional livelihoods.”

According to Kenya sugar industry strategic plan (2010-2014), the Kenyan sugarcane industry is a major employer and contributor to the national economy. Sugarcane is one of the most important crops in the economy alongside tea, coffee, horticulture and maize. Farm households and rural businesses depend on the injection of cash derived from the

industry. The survival of small towns and market places is also dependent on the incomes from the same. The industry is intricately weaved into the rural economies of most areas in western Kenya. Besides the socio-economic contributions, the industry also provides raw materials for other industries such as bagasse for power co-generation and molasses for a wide range of industrial products including ethanol. Molasses is also a key ingredient in the manufacturing of various industrial products such as beverages, confectionery and pharmaceuticals.

Currently, the industry directly supports approximately 250,000 small-scale farmers who supply over 92 percent of the cane milled by the sugar companies. An estimated six million Kenyans derive their livelihoods directly or indirectly representing 16% of the entire population (KSI 2010). The total area under cane in the country presently is 203,730 Ha, of which 189,390 Ha belongs to out-growers and 14,340 Ha. Nucleus Estates (land owned/leased by mills to grow cane) (CBS 2004). According to Export Processing Zone Authority EPZ (2005), the growth of the sector is vital to the economic development of a country as this ensures increased income and employment of rural population especially small scale producers who constitute 75% of the Kenyan population. The IEA (2005) has it that the sugar industry ensures food security and improves rural livelihood, it also provides sustainable livelihood to millions of Kenyans. However most of the industry actors want a stakeholder system benefitting all. Farmer's should be given more powers to manage the industry without interference, (Ochola, 2005).

According to Report of The Departmental Committee on Agriculture (2015), Kenya has eleven (11) operational sugar mills in the country, 1 to be commissioned in Kwale (Kwale International Sugar Company) while 2 mills, Muhoroni and Miwani are under receivership. In this study, focus will be on the region of Bungoma East Sub County that has farmers who supply cane to the sugar factories namely, Nzoia Butali and West Kenya companies and how the factories and farming venture of cane has impacted on their livelihood. The study therefore looks at the influence of sugar factories on the improvement of cane farmers' livelihood in Bungoma East Sub County, so as to provide data that will aid in policy formulation.

1.2 Statement of the problem

The sugar industry in Kenya supports directly or indirectly six million Kenyans, which represents about 16% of the entire national population. The industry contributes about 7.5% of the country's GDP and has a major impact on the economies of Western Kenya and Nyanza regions and, to a lesser extent, Rift Valley, (Central Bureau of Statistics 2010). In the Report of the Kenya Anti-Corruption on sugar, (2010) has it that the subsector is a tool for social development that provides gainful employment and wealth creation in the rural areas of Kenya. Growth of the sector is vital to the economic development of the country as this ensures increased income and employment to the rural population especially small scale producers thus the need for an initiative from the stakeholders to streamline the industry for the benefit of the farmers, so that their livelihood may be improved.

In this context, Nzoia Sugar Company (NSC), West Kenya Sugar Company (WEKSCO) and Butali Sugar Company (BUSCO) rely heavily on the sugarcane supplied by farmers for their sustainability. It takes one and a half years (18months) for cane to be ready for harvesting. The farmer meets all the operational costs, land leasing/purchasing, land preparation, planting, and maintenance then the companies takes up transportation the cane to the millers for processing. In most cases sugarcane farmers devotes large parcels of their land to cane farming at the expense of other crops hoping to get good returns which turns out to be not the case. Currently payment per tonnage of cane delivered depends on the miller ranging from Ksh3000 to Ksh2800 per ton. The government has invested in the industry massively and its presence is expected to be reflected on the quality of life of farmers. Even though millers have added value, farmers are yet to experience any improvements in what they are paid for the cane and it is upon the governments to ensure all stakeholders are brought on board and solutions to problems affecting the industry addressed so that cane farmers may stand to benefit, (Ontomwa and Okoth, 2013).

The sugar sector that supports over 6M livelihoods through various activities is on decline. Cane farmers do not get the value of what they have invested in for. Much has been done by the government like through Comesa protection but the situation has not

changed. Stakeholders should rise up to the occasion to salvage the industry that plays a bigger role in people's livelihood.

1.3 Purpose of the Study

The purpose of this study was to look at the influence of sugar factories on the improvement of cane farmers' livelihood in Bungoma East Sub County.

1.4 Objectives of the Study

The study was guided by the following objectives;

1. To establish how income from cane supplied to sugar factories influence improvement of cane farmers' livelihood in Bungoma East Sub County.
2. To examine how Sugar factories influence improvement of education of cane farmers' livelihood in Bungoma East Sub County.
3. To assess how Sugar factories influence improvement of food security as a livelihood enhancement of sugarcane farmers.
4. To determine how input by sugar factories influence improvement of cane farmers' livelihood in Bungoma East Sub County.

1.5 Research Questions

1. How does income from cane supplied to sugar factories improve cane farmers' livelihood in Bungoma East Sub County?
2. How do Sugar factories influence improvement of education of cane farmers' livelihood in Bungoma East Sub County?
3. In what ways do sugar factories influence improvement of food security as a livelihood enhancement of cane farmers' in Bungoma East Sub County?
4. How do input by sugar factories influence improvement of cane farmers' livelihood in Bungoma East Sub County?

1.6 Significance of the Study

It is hoped that the study will help government agencies in policy formulation regarding the welfare of sugarcane farmers by curbing cheap importation of sugar and advocating for good payment. The knowledge gained from the study will act as a basis

for further research in various aspects of companies in relation to suppliers of raw materials and improvement of cane varieties. The information in the study will also be useful to Non-Governmental Organizations (NGOs) that advocate for economic welfare of the citizens. Sugarcane farmers can also evaluate the viability of sugarcane farming as compared to other economic uses of land. It is hoped that the study will assist the government of Kenya in coming up with long term solutions to the issue of sugar shortage, which has become a major problem in the country and which leads to importation of large amount of sugar from outside the country. This can reduce by the increase in the production of sugar locally by the local sugar factories in Kenya.

1.7 Basic Assumptions of the Study

The study assumed that sugarcane farmers in Bungoma East sub – county majorly depend on Nzoia Sugar Company, West Kenya Sugar Company and Butali Sugar Company for their livelihood. The study assumed that participants in the research were willing to participate freely and give honest opinions in the study. It was assumed that the sample chosen for the study was a fair representation of the entire target population. Finally, the instruments used in the study captured the variables under investigation. Respondents were willing to provide accurate information and were to be looked at in the study and that the data collection instruments were to exhibit validity and reliability.

1.8 Limitation of the Study

The study would have been carried out in all the sugar region of Western Kenya and Nyanza to increase its external validity but it was not possible due to the vastness of the study and the limited time span in conducting the study. The researcher reduced this limitation by confining the study to sugarcane farmers supplying cane to NSC, WEKSCO and BUSCO within Bungoma East Sub County. The other limitation was that the respondent could give biased information and this false information might affect the whole study. The researcher was friendly to the respondents so that the respondents could be confident in him/her when disclosing their information. There was financial constrain for example; making a number of travelling to go and collect data, telephone calls expenses, printing of questionnaires which some of them were not returned and others

spoiled. The researcher ensured that he had adequate finance necessary for carrying out the research fully to avoid short coming in the process of writing the proposal.

1.9 Delimitation of the Study

The study was carried out in Bungoma East District, of Bungoma County in Kenya. This particular location was chosen because; it had farmers who supplied cane to West Kenya sugar Company, Butali Sugar Company and Nzoia Sugar Company.

1.10 Definitions of Significant Terms Used in the Study

Livelihood of sugarcane farmers Means of securing necessities of life due to Sugar production.

Sugar Factories Means West Kenya Sugar Company, Butali Sugar Mills and Nzoia Sugar Company.

Income Means earnings farmers get after Delivering Cane to sugar factories.

Farmers People who grow and supply sugarcane to Nzoia Butali and West Kenya Sugar Companies.

Food security the ability to have access to enough Food by the people.

Assets Resources that people use to achieve Livelihood objectives.

Improvement The ability to live a better quality life.

1.11 Organization of the Study

The study was organized into five chapters; chapter one basically gives the introduction and described the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, basic assumptions of the study, limitations of the study and delimitations of the study. Chapter two provided a review of literature related to the study thematically as per the research objectives. Chapter three focused on the research methodology discussed under the following subheadings; research design, target population, sample size, sample selection, research instruments, data collection procedures, data analysis technique and ethical issues in research. Chapter four focused on the study findings, analysis, interpretations and discussions. Chapter five, which is the last chapter, focuses on summary of the findings, conclusion, recommendations for policy action, and suggestion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the literature related to the study. It covered the following themes: Concept of the of improvement of farmers livelihood, income from cane delivered and improvement of farmers livelihood, practices of sugar factory on education and improvement of cane farmers' livelihood, sugar factory practices on improvement of food security as a livelihood enhancement of sugarcane farmers, Input by sugar factories and influence on improvement of farmers' livelihood, theoretical framework, conceptual framework and summary of the literature review..

2.2 Improvement of Farmers Livelihood

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base(Chambers & Conway,1991). Livelihoods are formed within social, economic and political contexts. Institutions, processes and policies, such as markets, social norms, and land ownership policies affect our ability to access and use assets for a favorable outcome. As these contexts change they create new livelihood obstacles or opportunities. (IRP 2005).

In this perspective, the diversification of agricultural and other livelihood strategies, through community development activities, eases the pressures on weakened environmental resources, making livelihoods more economically and environmentally sustainable(IRP 2005).Engaging the ultra-poor and other marginalized groups in greater market activity is one means of decreasing their economic and social vulnerability, which strengthens the livelihood strategies of highly vulnerable groups by empowering them to take advantage of a broader range of economic opportunities. One final important characteristic of livelihoods is their interdependence. A given livelihood may rely on other livelihoods to access and exchange assets. Traders rely on farmers to produce

goods, processors to prepare them, and consumers to buy them. Livelihoods also compete with each other for access to assets and markets. This is a particularly important consideration when planning livelihood assistance. Fewer and fewer households rely on one source of income and the informal economy absorbs over half of the world's labor force(Chen et al.2004).

With growing populations and the need to provide sufficient supply of food it is evident that agricultural intensification plays a critical role in the growth of the rural economies of developing countries (Hazell 1995). Several studies show that agriculture intensification technologies foster and provide benefits for rural livelihoods. Among these findings, Larson and Frisvold (1996), Wallace and Knausenberger (1997), Kelly et al (2001), Bamire andManyong (2003), Morris et al (2009) outline the benefits derived from fertilizer use in the intensification process. Common among these findings are increased yields of several crops and hence improvement in income levels and general well-being of rural people. High yielding varieties of crops is another aspect of the intensification literature which impacts on the poor and deserves some attention. Bourdillon et al (2003) assessing the effect of high yielding maize varieties in Zimbabwe, found that there was improvement in the nutrition and health status among children in the project. Incomes were marginally higher from the high yielding varieties, and participants were able to reinvest in livestock which reduced vulnerabilities of households during time of drought (Bourdillon et al 2003).

Poverty is widespread in the rural areas of South Africa. The extent and nature of poverty in the rural communities has led to the implementation of a range of development programs and projects aimed at improving rural livelihoods; thus many of the projects have been implemented with the argument that future economic, social, and environmental development in the rural communities is best secured by improving rural economy, which is continuously marked by high levels of unemployment,(May 1999).A sustainable community development project should preferably have a positive effect not only on the involved, but also bring about development in the community as a whole.

Insights on the dynamic nature of livelihoods diversification are also provided by Koczberski and Curry (2005). While investigating livelihood strategies among oil palm settlers in Papua New Guinea, they realized that there were remarkable changes over the years in activities pursued by householders. They identify that the ability of members to diversify their on-farm activities provide opportunities to re-invest back into oil palm and food production. They report that palm oil and food crop production activities remain the major source of income with only a small proportion of these households sourcing income from the non-farm sector. Koczberski and Curry (2005) identify that there is the need for intervention to provide a linkage between the non-farm and the palm oil sector to encourage improved employment.

2.3 Income from cane delivered and improvement of farmers' livelihood

The sugar industry supports over 6 million Kenyans and is a major source of income for over 200,000 small-scale farmers who account for 85% of cane supply to the six companies (KSI 2010). Sugar cane farming is not only a source of subsistence income for millions of poor households but also provide employment to the poor living in the rural villages of sugarcane growing zones. Kenya has predominantly been an agricultural based economy, where almost every household is involved in some agricultural activity particularly crop production. The contribution of crop income to total income is high and an effective target for raising incomes through appropriate policy direction in the sector. In kind incomes are a source of food to rural households while cash income represents the household's purchasing power for the other basic necessities e.g. shelter and clothing. Rural household incomes are complex owing to the multiple sources that it comprises of. However, the main sources of income for the rural people are crops, livestock and off farm activities like small businesses.

The sugar industry is intricately weaved into the rural economy of most areas in Kenya (KSB, 2010). In Western Kenya and Nyanza sugar belt, farm households and rural business depend on the injection of funds derived from the sugar industry. The survival of small towns and market places in these regions is dependent on the income from the sugar industry. A study in Nyando sugar belt revealed that cane farming is a major source of income to the farmers, (Odenya et al. 2009). In the study, 81.3% of the

Nyando farmers derived income from cane farming, 16% from cane farming and business and only 2.7% from employment and other businesses. Sorre (2005) revealed that sugarcane income enabled farmers raise sugarcane on both their own farms, leased plots and also enabled them to invest in other businesses. According to Oniang'o (1987), introduction of sugarcane led to buying of land from non-cane farming families by cane farming families in order to increase their income.

Personal income may be defined as the sum of the market value of rights exercised in consumption and the change in the store of property rights between the beginning and end of the period, (Simons, 1938). Households that operate farms often receive, in addition to their rewards from farming, income from running non-agricultural businesses, from waged employment and from social transfers. It implies that quite a number of people will earn their income through waged employment by working in sugar cane farms and factories as laborers. It is important when assessing the welfare of agricultural households not to assume that these other sources are unimportant. Empirical evidence suggests that they can be of great significance in many countries at all levels of development, (OECD, 2003). For example, in the United States over four fifths of the household income of farm operator households regularly comes from non-farm sources and in 2000 this was over 95 per cent, (Mishra et.al 2002).

According to USDA, on average, farm household income has been roughly comparable to the median for all U.S. households since the 1970s. In 2004, the most recent year for which comparable data exist, the average farm household had an annual net income of \$81,480, while the average U.S. household netted \$60,528. However, farm households that receive most of their income from farming experience more year-to-year fluctuations in household income than other households. Farm household income is often determined by a range of socio-economic and demographic factors, (Ibekwe 2010). When measuring income according to the approach to personal income outlined above, the flow of resources towards households comes in three main forms: from gainful activities, mainly employment and self-employment; from the ownership of property (rent from land, interest from financial assets); and from transfers, mostly social transfers organized by government but also private ones, such as from family members working

abroad. Depending on which definition of an agricultural household is applied, the farm business may be the only source of self-employment income, the main source or a minor source but it will always contribute a part of the total.

In economic analysis of the farm supply response study, price was a critical economic factor that determined farmers' production decision (Anwar & Naeem, 2008). In Kenya, the sugarcane pricing formula is used to determine the sugarcane price per ton. The pricing formula is recognized in the Sugar Act 2001. The sugarcane pricing formula is reviewed by the sugarcane pricing committee chaired by Kenya Sugar Board (Ingara, 2009). The formula used is as follows;

Sugarcane price = average price of ton sugar (prevailing month) * farmer's sharing ratio (50%) / 10.

But sometimes the formula is not used due to the market forces of supply and demand, sugar imports and competition between mills for sugarcane. Introduction of new sugar mills like Butali in Western Kenya, Sukari and Transmara in South Nyanza have brought stiff competition in the Sugar Industry affecting use of the pricing formula in purchase of sugarcane from farmers. Generally higher prices are expected to result in a larger output per area and increase in area of production. Yanagida & Bharti (1990), revealed that official procurement price for sugarcane at mill gate and relative returns to alternative uses of sugarcane were principal factors affecting sugarcane supply. This is further supported by Ramulu (1994) who concluded in his study that there was significant and positive influence of price and yield/acreage in cane production in Andhra Pradesh state of India.

Sorre (2005) revealed that the desire to satisfy growth needs led farmers in MSC scheme to use cane income to build houses. This is further supported by Oniang'o (1987) who revealed that in MSC scheme, 29.3% of houses were constructed from sugarcane proceeds. He further confers that apart from a few salaried employees, there are very few alternative income sources for house construction in Mumias sugar zone other than cane proceeds. Therefore the researcher sought to investigate the various financial factors that influence cane production by contracted farmers.

Agricultural activity is subject to different risks, some natural or biological in origin, others economic. These risks affect production volumes and prices and are thought to result in receipts and incomes that are more variable than in many other sectors. Farmers adopt strategies to reduce the variability of their total income. A number of market-based tools are at their disposal, like diversification of income sources, capital and debt management, marketing techniques, hedging on futures markets and insurance. In most countries, agricultural policies, shield farm households against large losses of income. Social policies play a role in providing a safety net and fiscal arrangements can help to smooth annual income variations (OECD, 2000). The contribution of agriculture to economic activity is concentrated in rural areas. Indeed, the presence of agriculture is a key element in the characteristic of rurality.

In many countries a main aim of agricultural policy is to support the income of farmers and their families. When the objective is to provide a “fair standards of living for the agricultural community”, as is the case with the EU’s Common Agricultural Policy, the comparability of the incomes of farm households with those of households belonging to other socio-professional groups is seen as important, (Hill, 2000). Where the aim is the alleviation of poverty, again the overall income of the household is an important indicator. The wealth of agricultural households is important because changes in the real value of that wealth is a form of personal income and is one that is typically less heavily taxed. In agriculture the ratio between wealth and current income is often large, implying that capital gains and losses may be disproportionately significant for farmers. The level of wealth is also a source of economic status, the potential ability to consume putting farm owners into a position different from people without wealth, (UN 2002).

2.4 Influence on education and improvement of cane farmers’ livelihood

Education in every sense is one of the fundamental factors of development. No country can achieve sustainable economic development without substantial investment in human capital. Education enriches people’s understanding of themselves and world. It improves the quality of their lives and leads to broad social benefits to individuals and society. Education raises people’s productivity and creativity and promotes entrepreneurship and technological advances, (Ozturk2001). Whereas disparities in education based on gender

and socioeconomic status can create a significant drag on growth a disparity in education that aligns with social, political, and economic fault lines creates resentments leading to violence, conflict, and instability. Schools and education systems can serve as channels for the development of peaceful societies or exacerbate the situation, depending on the policy insertion, (Miemie 2014).

The Aga Khan Development Network (AKDN) Education Programme in partnership with the Afghanistan government since mid-2002 helped to develop and deliver a reform plan that focused on quality improvement in the existing public education system. The programme pursued an approach that directly reflects the government's policies and sectorial plans, aiming to assist the public education sector after years of war to improve access and quality of basic, secondary and tertiary education in order to make it more relevant, effective and efficient. Specifically, the AKDN aimed to improve the quality of teaching in all government schools through strengthening education training institutions and the provincial and county departments of education; improving local support structures/systems for schools through increased community involvement; and ensuring a safe and healthy environment for students through the rehabilitation of destroyed infrastructure. Under the partnership, the AKDN undertook the construction of 16 schools and a hostel at the P1 Teacher Training Centre, and assisted with refurbishing the Centre, supplying furniture, and establishing and resourcing a library and a computer Centre (Shakil, 2003).

The Jordan Education Initiative (JEI), a public-private partnership involving the Government of Jordan, the international private sector, the local private sector, NGOs and donors under the auspices of the World Economic Forum's Global Education initiative brought together 45 partners and spend approximately \$22 million either through financial contributions or in kind payments. The initiative focused around improving education in 100 Discovery schools, developing the technology industry and providing life-long learning for Jordanian citizens. Through the initiative:

- a) The Jordanian Ministry of Education gained expertise on implementation of technology based learning solutions.

b) There was acceleration in the deployment of internet connectivity and computers in schools.

c) The e-curricula drew attention to the blending of traditional learning resources and exposed teachers to new ways of teaching and raised awareness of the potential of using ICT to enhance learning and improve the quality of learning experiences (Mckinsey, 2005).

This implies that public-private partnerships in Kenya can help improve access and delivery of education as well as enhance the quality of education through effective use of technology. In order to tackle the problem of high dropout rate and bring in out-of-school children, the Indian government took a series of measures to make schooling more attractive to all children in the age range of 6-14 years by introducing policies like mid-day meals, school adoption programs (by better off private schools) and inviting the private sector (particularly in ICT) to participate in the endeavor. A Minimally Invasive Education Experiment (MIE- the Madangir Project) was effective in providing access to computers to children who could not access them at home or at school. Tooley, (2001) observed that the delivery of education is an industry, not an office of the government and this industry can deliver effectively by harnessing the power of the private sector to reach the poorest through modern technology. Therefore, with appropriate inputs from both the private and public sectors, enormous resources and opportunities can be put at the disposal of the education system (Jha, S. & Chatterjee, S., 2005).

Kande (2007) noted that consistent increase in enrolment in private secondary schools is evidence enough that demand for secondary education far outstrip supply and with the introduction of Free Primary Education (FPE) in 2003 and Free Day Secondary Education (FDSE) in 2008, this will even rise to magnitude levels. There is therefore greater need for the government to collaborate with the private sector, civil society and the business community to expand the existing places to improve access to secondary education in Kenya. Owing to the ever-rising demand in secondary school education, the long-term goal for the government has been massive expansion and improvement of national, provincial and district schools to avoid situations where tens of thousands of

primary school pupils compete for only 4,000 places in 18 national schools (Daily Nation, Jan. 12th 2011).

The Ministry of Education, due to intense pressure from the expanded pool of primary school leavers occasioned by the FPE, upgraded about 100 provincial secondary schools to national schools status so as to raise the number of national schools to 118 and each County to have two national schools. However, despite grand financial plans to cater for the newly established national schools, the government spends almost 95% of secondary education budget on teacher's salaries and other benefits leaving only 1.4% of total secondary education budget allocation for operational costs, laboratory equipment and physical facilities (KIPPRA, 2007). Taking into account that there are no special additional resources to be injected into the education system, the proposal for new national secondary schools require radical reforms to address expansion, financing and resource requirements to avoid the proposed national schools becoming decadent "jua kali" national schools lacking academic excellence (Standard Newspaper, Feb.2011). These require the government therefore to explore and strengthen alternative financing options for secondary education such as public-private partnerships.

In a developing country like Kenya, the onus of development lies mainly with the government, which faces the predicament of multiple demands and limited resources. This leads to a situation where even fundamental objectives such as basic literacy for all are not met. On the other hand, there exists a vibrant private sector and business community, which has resources and desire to undertake social responsibility (Jha and Chatterjee, 2005). Although the concept of CSR is gaining some prominence within policy debates in Kenya, it is not applied widely and is usually associated with philanthropy. However, there are many private sector-related initiatives that might be described as expressions of CSR as well as public-private partnerships (Kivuitu et al, 2005).Through Corporate Social Responsibility, Kenya Airways (KQ) helped in supporting the renovations of 14 classrooms and administration block of Farasi Lane Primary School located in Lower Kabete, Nairobi. Kenya Airways also helped in replacing windows and doors, painting and plastering of walls and in addition new floors were constructed and the entire school was painted. The technical team donated used

furniture and talks are under way to construct a kitchen and dining hall. Kenya Airways also commissioned a secondary school project in Kisii town as part of its Corporate Social Responsibility.

The airline also fully renovated classrooms, administrative block and staffroom and installed a gate to improve security at a cost of Kshs 2 million for Riobara PAG Secondary School in a bid to improve learning facilities for about 250 students and staff (Kenya Airways CSR, 2008). In 2007, Telkom Kenya in her pursuit of Social Responsibility supported the Good Neighbors Foundation, a programme by State House Girls' School parents and students to cater for the needy students in the school. In Kenya, Kenol/Kobil (a multi-national oil corporation) engages in a number of long-term corporate social responsibility projects. These include the long-term rehabilitation and capacity-building programme for Mama Ngina Children's Home, and the Kenol Scholarship Fund that was set aside to enable bright children from underprivileged families to acquire quality education. The company has since been offering employment opportunities for bright graduates of its CSR projects.

In 2010, the Equity Group Foundation (of Equity Bank) under its corporate responsibility programme partnered with the MasterCard Foundation to launch a 9-year Shs.4 billion comprehensive secondary school education fund to assist academically gifted students from poor backgrounds to pursue secondary education. In 2011, the programme received support from UKaid, the Wings to Fly programme, which extended scholarships to 1,200 students who performed well in the 2010 K.C.P.E but who come from poor backgrounds. The Wings to Fly programme hopes to reach 5,600 deserving children

The relation between education and better health and life expectancy involves causation in both directions, for greater health and lower mortality also induce larger investments in education and other human capital since rates of return on these investments are greater when the expected amount of working time is greater, (Ozturk 2001). Where formal education systems are flanked by programs of early learning and literacy and skills development, additional benefits accrue to the individual, the community, society, and formal education itself (UNESCO, 2005). Education is widely seen as one of the most promising paths for individuals to realize better, more productive lives and as

one of the primary drivers of national economic development. The citizens and the government of Kenya have invested heavily in improving both the access and quality of education, in an effort to realize the promise of education as well as to achieve the education-related Millennium Development Goals and Vision 2030, (Glennerster et al., 2011) and in this perspective sugar factories have contributed a lot in education of the region through scholarships, funding of education facilities and training. According to CBS (2006) Ignorance or lack of access to information is a major handicap to human development in Bungoma. The primary school age population (6-13) is 245,000 of which the school enrolment is 97%. However, the dropout for boys is 57.5% and 53% for girls by Standard Eight. The enrolment at secondary school is 29% for boys and 26.5% for girls with a further drop out rate at 26.5% and 30% respectively for girls. This works out to about 40,000 who complete secondary school or a mere 17%. The majority of the population in Bungoma is literate with primary education. Even those who complete secondary school education, only 3% proceed to tertiary institutions. The rest join the unemployed and indulge in menial occupations such as boda-boda or bicycle taxis, as they have limited employable skills. Ignorance is not only limited to the youthful population. Indeed the productive potential of the county could be enhanced greatly by improving access to information and knowledge. All sectors including education, health, agriculture, afforestation (environment) and commerce would stand to gain a great deal by skills enhancement and new knowledge propagation systems.

2.5 Influence on food security and improvement of cane farmers' livelihood.

The concept of food security is multi-dimensional, encompassing food availability, affordability, adequacy, safety and quality, (Kirimi et al (2013). According to World Hunger and Malnutrition (2013), the United Nations defines food security as "all people at all times having both physical and economic access to the basic food they need." It continues to say that food insecurity results from climate change, urban development, population growth and oil price shifts that are interconnected and rarely confined by borders. It provides the case of Nigeria, where, being Africa's most populous country, a legacy of corrupted governance and an economy based primarily on oil exports has left the agriculture sector significantly weakened and millions of Nigerians hungry. And

poorer neighboring countries export more food to Nigeria in exchange for petrodollars. Household food security also means that all people in a household have access to enough food at all times to maintain a healthy and active life, Nord, Andrews and Carlson, (2006). It includes availability of nutritionally adequate and safe foods, and an assured ability to acquire acceptable foods in acceptable ways without resorting to emergency food supplies, scavenging, stealing, or other coping strategies (Price et al., 2000).

Availability and ability to acquire food are therefore the two basic elements towards household food security, (McCalla 1999). The household's ability to acquire food is influenced by all resources (tangible and intangible) available to a household, which can be used to acquire food through production, exchange or transfer. The more the resources, the better the access to food. The rate at which these resources can be converted into food also influences a household's ability to acquire food. The more favorable the conversion rate, the greater the amount of food acquired. Food insecurity has become the heart of international movements to overcome hunger and poverty. The first Millennium Development Goal (MDG) sets as its target the eradication of extreme poverty and hunger, with a target of halving the incidence of poverty and hunger by 2015 (FAO, 2007). It is estimated that more than 800 million people globally suffer from food insecurity (FAO, 2007). Out of the 800 million, some two-thirds live in rural areas of developing countries(Kohlmeyer, 2003). By the year 2050, global demand for food will double (Kohlmeyer, 2003).

Therefore, food security issues cannot be ignored Strasberg et al (1999), found that household agricultural commercialization in Kenya increased fertilizer use and productivity for food crops. This may be because commercialization provides a source of cash for purchase of inputs; enables households to access inputs distributed through cash crop marketing firms; and, acts as a source of income to purchase draft oxen and traction equipment that may promote food crop productivity.

A study by Lihanda (2003) revealed that Mumias region was underdeveloped, and the farmers grew small areas of subsistence food crops with large areas under bush and rough grazing land. However studies by Mwachili (1995) concluded that introduction of

sugarcane contract farming negatively affected food production. MSC sugarcane contract has a clause that recommends a third of the farmers land to remain for food production while the rest be used for sugarcane farming. The contract has a clause that states that the company has an obligation to provide food security programmes to the farmer. However, it has been impossible for the contracted sugarcane farmer to set aside land for subsistence food crop production, thus infringing on the farmers ability to obtain adequate food supplies and diversify income source (Wawire, Nyongesa&Kipruto, 2002). In Kenya the land sizes have relatively become small due to fragmentation and redistribution. A study by Wawire et al., (2002); Odenya et al (2008) revealed that as household increases, there was a general trend of land diminishing. The study in Nyando region revealed that the average family size of 4 persons reside on 2 acres of land hence in -adequate land for sugarcane and food production.

Langat et al (2011), found that among smallholder tea farms in Nandi South, Kenya, an increase in the ratio of land allocated to tea to that allocated to maize was associated with greater food diversity score. This was attributed to the income from tea realized throughout the year, which ensured household access to quality food. Kennedy andCogill (1987) showed that income from cash crops control by women was associated with improved child nutritional status, suggesting that women were more likely to spend more on food and health care. According to these authors, a 1% increase in sugarcane income in South Nyanza District in Kenya resulted in an increase in energy intake of 24 kilocalories per household per day. On average, sugarcane production increased household income by 15% which increased household energy intake by 360 kilocalories per day, or approximately 33 kilocalories per day per person in the household.

Kirimi et al (2013) has it that innovations that enhance households' access to land, education, savings and employment can be instrumental in raising their ability to produce food and access it from the market, ensuring food security. In addition, female-headed households were more likely to be food insecure, which suggests an increasing need for interventions that economically empower women, particularly the widows. Also market participation can play a significant role in reducing food poverty and by

extension poverty in general. This suggests that facilitating the expansion of market participation by smallholder farmers can be critical in helping households transition out of food poverty. This will entail enabling access to production inputs, which are both affordable and suitable to small scale farmers, thus ensuring that farmers are not trapped in low productivity–low return farming activities that lead to food insecurity. It is also important to ensure increased availability of commercial fertilizer and seed in local markets near the farmers. The use of productivity enhancing inputs will improve the ability of smallholder farmers to produce sufficient marketable surplus. Also, it will be important to strengthen efforts geared toward creating market linkages for the various agricultural enterprises.

A Global Food Crisis and Fair trade report (2009) aptly has it that a focus on small farmers must be at the centre of any serious strategy to tackle poverty and increase food security and productivity because: Such a focus would reduce poverty because Small farms are home to two billion poor people and they play major social roles, providing safety nets or subsistence living for the rural poor. Small farmers tend to spend their income on local goods and services, boosting local economies, and are more likely to employ people than adopt capital-intensive technologies. Also a focus on smallholders would also increase food production since small farms produce the bulk of many developing countries' food: up to 80% of Zambia's food, for example, and 45% of Chile's vegetables, corn and rice. A considerable body of evidence also suggests that small integrated farming systems can also yield more per hectare in the long-term than large-scale monoculture farms.

2.6 influence of sugar factories input and improvement of farmers' livelihood

Agriculture is a potent driver for poverty reduction. The World Bank estimates that GDP growth from agriculture generates at least twice as much poverty reduction than any other sector. Currently 65 percent of people in developing countries are involved in agriculture, 1.3 billion of them are small farmers, with limited access to inputs, infrastructure and markets thus showing an urge to invest in it to improve the farmers' livelihood, (World Bank 2013). In countries where agriculture represents one of the primary livelihoods, concerted efforts to improve productivity through sustainable practices could change the

lives of millions. Therefore farmers need to be able to access markets at the local, regional and global level in order to sustain a livelihood from their activities which entails improving access to transport, storage and market facilities. Improving the footprint of agriculture while increasing production needs a concerted effort in two areas: first closing the uptake gap of existing best practices and technologies by focusing on knowledge sharing and creating supportive extension services networks; and second investing in innovation and research to provide the solutions for tomorrow and ensure agricultural policies are science-based, (IFC 2011).

The entrenched traditional system of land ownership is almost sacrosanct and represents a sensitive issue particularly in the farming communities of west Kenya and the rift valley. Extensions to the sugarcane land in these areas should follow the same pattern of out grower-miller relationship which secures involvement of land owners as part of the production system. The millers should improve performance of their nucleus farms to inspire out growers to follow suit. Also the survival of small towns and market places in these regions is dependent on the income from the sugar industry. In Ethiopia for example in addressing the challenges of sugar industry is to expand production. Therefore, it is implementing an ambitious plan, through the ESC, to more than double production by expanding the cultivated land area and improving production infrastructure (dams, plant renovation) Sugar production and especially the extension in cane area and processing have improved the livelihood of some neighboring households through employment and income generation. Two of Ethiopia's main goals of its sugar policy instruments are the stabilization of the sugar supply and the control of consumer price. The instruments employed to achieve these goals may affect the livelihood of poor stakeholders and have an effect on the wages of sugar workers and farmers. Maintaining a low refined sugar price to consumers involves limiting prices and wages at the production level (FAO 2013). Profitability is of great consideration in any business and is affected by several factors. Waswa, et al., (2012) have the view that input costs influence the net income of the sugarcane farmers. This is because the more input costs are put in the farming activity correctly, the more the income is attained by the farmers.

Under sugarcane contract farming, factories have the obligation to supply on credit farm inputs and agriculture-services such as land preparation, seed cane and fertilizer, harvesting and transport. Agricultural inputs and services take about 60% of the cane price (KESREF, 2009). The inputs and services are charged interest of 12% per annum deducted from sugarcane proceeds. In commercial production, costs of inputs have a great bearing on adoption of farming practices and recommendations by Olwande, Sikei & Mathenge (2009) in their study revealed that fertilizer use was higher in major cash crops such as sugarcane, tea and coffee due to organized input credit schemes which allow farmers to acquire inputs on credit and repay through deductions made on deliveries of the produce.

Declining profitability in cotton farming in Malawi led to decline in cotton production (Kumwenda & Madola,2005). Effective profitability results are obtained when management creates conditions workers perceive as beneficial to them and productivity gains are shared with workers (Fein, 1974). The economic performance of contracted cane farmers is affected by several transaction costs incurred during the exchange process of farming to milling. Taylor (1917) in his scientific management theory put forward the idea that high wages provided motivation for efforts in production. Masuku (2011), in his study on sugar-cane profitability in Swaziland reported that farmers profitability was significantly affected by the yield per hectare, farmers' experience and the distance between the mill and the farm (transport cost). The study revealed that farmers closer to the mill made more profit compared to those further away and those farmers with more land under sugarcane production had gross profit increased.

Extension staffs employed in contract farming ventures are usually the key link and the direct interface between the sponsor's management and farmers. They require a number of key skills that include: A good comprehension of the crop(s) or animals under contract, a sensitive and empathetic understanding of the social customs, language and farming practices of the communities they work with, an ability to communicate effectively with farmers, organize and administer cropping schedules and buy proceeds honestly and impartially. They must also possess an understanding of agronomy, farm

management techniques and the potential capabilities of the farmers with whom they work. Extension staff must first obtain the credibility and trust of the farmers they advise in order to successfully implement the policies of the sponsor. In 1999, the Kenya Tea Development Authority experienced serious unrest amongst its growers, reportedly due to the Authority's inefficient extension services (FAO, 2010). Therefore the extension officer must have expert power to be able to pass professional knowledge to the farmers. Nuthall & Padilla (2009) in their study found out that extension education was an effective way of improving technical efficiency in the production of sugar-cane in Philippines. They recommended targeting of farmers with long farming experience and young farmers who lacked farming experience. Training of farmers can take place through routine farm inspection visits by extension staff, formal and regular meetings with farmer groups that concentrate on the relevant activity at the time, e.g. seed sowing, transplanting, fertilizing, pest and disease control or harvesting (Swanson & Claar, 1984).

In the other potential areas where the development of a sugar industry based on irrigation of the crop proves feasible, it is advisable that the new investment own a sizable nucleus farm to control production targets and balance dependence on Out growers as suppliers of raw material. However, the land lease agreement with potential investors should include terms specifying the percent of cane to be delivered by Out growers and the technical support to be provided. Corporate social responsibilities to support social infrastructure in local communities should be agreed to with the local community and provided regularly. Farmers should be assisted in all matters related to production and operation including assisting farmers to get required loans to carry out field operations and purchase inputs and negotiate cane pricing as well as cane harvesting and transportation contracts with millers. Effort to be considered to ensure timely payment to farmers on delivered cane.

Also communities need to be encouraged to engage in reforestation, water conservation and diversification. These initiatives can be driven by the companies, but must be implemented by the communities to enhance ownership and sustainability. The industries organizations have the technology and resources to support environmental initiatives through capacity building and awareness raising campaigns. Some companies have

developed interactive and accessible environmental programs that explain the industry and stakeholder roles in protecting the environment, whilst at the same time explaining the operations of the sugar industry. Outreach programs using schools, colleges and youth groups are potential ways of increasing the impact of initiatives and raising the profile of the company as responsible citizens and improving community relations,(IFC 2011).

Many companies support education programs either through supplementary support to government facilities in or around the company or establish and run estate schools, or provide scholarships or school fee provision for employees families, or provide education support to alternative institutions such as tertiary education establishments to raise standards of education and to improve the skills of the future workforce. This is very much dependent on the educational facilities and structures in place at national and local levels. In Brazil, some sugar companies, particularly in the remote or newly developed areas, will find it necessary to support the state education structures through additional facilities and teaching aids to ensure that the quality and standards of education are sufficient, (IFC 2011).

2.7 Theoretical Framework

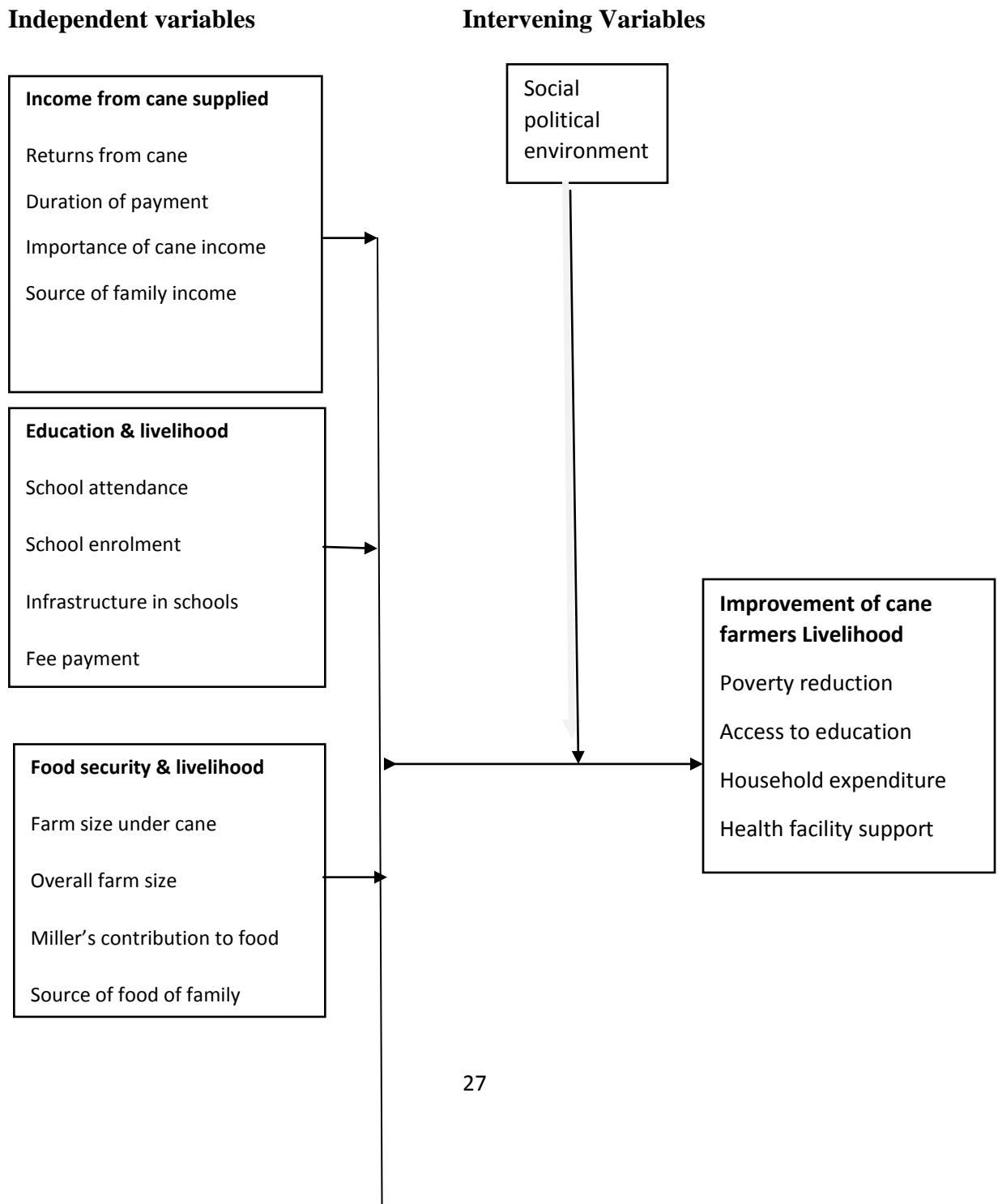
The study was based on Maslow's theory of needs. The theory recognizes basic human need that should be met first which forms the basis of livelihood. These needs include food, housing and shelter. The study finds this theory appropriate as it would enable the sugarcane farmers visualize the extent to which sugarcane farming has influenced their living standards. The theory explains that human can only seek higher needs after the basic needs have been met.

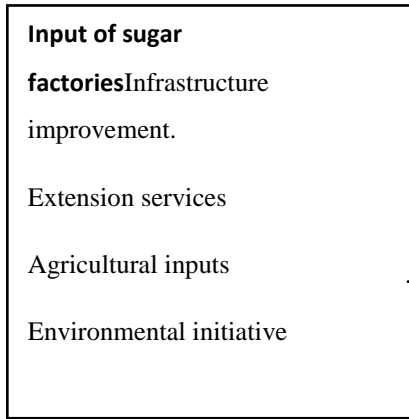
2.8 Conceptual Framework

In this study, the conceptual framework was guided by the research objectives. The objectives used were: to establish how the income from cane supplied to sugar factories influence improvement of livelihood of the cane farmers' second was to examine how the Sugar factories influence on education improves the cane farmers' livelihood, third was to assess how the Sugar factories influence the improvement of food security as a

livelihood enhancement of sugarcane farmers and to determine how input by sugar factories influence improvement of livelihood of cane farmers.

Fig. 2.1 Conceptual Frameworks





ceptual framework with the influence of sugar factories in improving the livelihood of sugarcane farmers. The independent variables includes income from cane supplied, education and livelihood improvement of sugarcane farmers, food security and income improvement of farmers and input of sugar factories and livelihood improvement of cane farmers. The dependent variable is the improvement of cane farmers' livelihood. Intervening variables are social political environment.

2.9 Summary of Literature Review.

The literature captured in this section includes concept of improvement of farmers' livelihood from various authors, income from cane delivered and improvement of farmers' livelihood, practices of sugar factories on education and improvement of cane farmers' livelihood Sugar factories and improvement of food security as a livelihood enhancement of sugarcane farmers and input of sugar factories livelihood improvement of sugarcane farmers. This section also explains why the study was based on Maslow's hierarchy of needs and diagrammatic representation of conceptual framework that shows how independent variable interplays with the dependent variable with the intervention of intervening variable.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covered the methodology of study that included the research design, the area of study, the target population, the sampling procedure, the sampling techniques, the research instruments, validity and reliability of the research instruments, and the procedure of data analysis.

3.2 Research Design

According to Kothari (2004), a research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group. It is a method of collecting information by interviewing or administering questionnaires to samples of individuals.

Descriptive survey design was used in this study. This design not only offered descriptions and explanations, but it also identified and predicted relationships between variables of the study (Mugenda and Mugenda, 1996). Descriptive survey design enabled the researcher to adopt both qualitative and quantitative approaches to data collection. By extension, through descriptive survey research design, the researcher was in a position to analyze data using both qualitative and quantitative techniques.

3.3 Target Population

According to the Sub county office register Ministry of Agriculture, the Sub County has seven locations recognized by the sugar factories which Include Mihuu, Ndivisi, Maraka, Misikhu, Sitikho, Matulo and Bokoli. It had 9550 sugarcane farmers by the year 2013. This, with 10 Agricultural Extension Officers, constituted the target population. According to Brenda, (2009) the target population for a survey is the entire set of units for which the survey data are to be used to make inferences. Thus, the target population defines those units for which the findings of the survey are meant to generalize.

3.4 Sample size and Sampling Procedure

According to Intell, (2012) a sample is a part of an entire population that possesses attitudes, opinions, habits, or characteristics that you wish to study. The appropriate sample size is influenced by your purpose in conducting the research.

3.4.1 Sample size

According to Wambiri and Muthee, (2010) a sample is a small group of persons or items selected from the population that will be subjected to the study, and is usually a representation of the entire population. For this study, the researcher having a population of 9550 people used a sample of 370 respondents. The researcher used Krejcie, and Morgan, (1970) table to determine the sample size. Since the population of 9550 is nearer to 10,000 than 15,000 from the table, the sample size was 370 respondents as shown in appendix 1.

3.4.2 Sampling Procedure

Sampling, according to Orotho and Kombo, (2002), is the process of selecting the required individuals for the study whereby a number of individuals are selected from a population such that the selected group has elements representative of the characteristics found in the entire population. Sampling is useful in research because one learns some information about a group by studying a few of its members thus saving time and money.

The researcher used stratified sampling on the seven locations to select the farmers, which included, Mihuu, Ndivisi, Maraka, Misikhu, Matulo and Bokoli. Proportionate

method was used where; the researcher selected samples from each location depending on the number of farmers found within the location. In relation to this, samples were selected based on the formula;

$$\text{Sample size per location} = \frac{\text{Total No. of farmers per location}}{\text{Total NO. Of farmers in sub county}} \times \text{sample size}$$

Total NO. Of farmers in sub county

The results of the sample size selected is as shown in Table 3.1

Table 3.1 Table for Selecting Sample Size

Location/Ward	Target Population	Sample Size
Mihuu	1469	56
Ndivisi	1540	60
Maraka	1370	54
Misikhu	1222	47
Sitikho	1364	53
Matulo1362	53	
Bokoli1223	47	
Total	9550	370

3.5 Data Collection Instruments

According to Design, (2005) data collection instruments are the tools that assist the researcher in the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes. For this study, the researcher used

questionnaires. A questionnaire is a collection of items to which the respondent is expected to react, usually in writing (Kothari, 2004). The questionnaire being the main research tool for this study was conducive based on the nature of the study time and objectives of the study. The items on the questionnaire was developed on the basis of the objectives of the study.

The questionnaires were both open-ended and closed-ended, and was divided into five Sections whereby section A contained questions on general information of the respondent, Section B contained questions on income of the farmers, Section C contained questions on factories practices on education and improvement of livelihood, Section D had questions on food security and improvement of livelihood; lastly, Section E had questions on the assets acquisition and improvement of farmers, livelihood of farmers.

3.5.1 Pilot study

The research instruments were piloted in order to standardize them before the actual study. Mugenda and Mugenda (1999) asserts that pilot testing is a very important step in any study. Pilot testing is a trial run of procedures and instruments that one plans to use. According to Mugenda and Mugenda (2003), a pre-test sample of a tenth of the total sample with homogeneous characteristics is appropriate for a pilot study. For the study, 37 respondents which is equivalent to 10% of the sample size were given questionnaires to fill during pilot testing.

Respondents selected for pilot testing were not included in the sample during the actual data collection phase. The researcher made formal arrangements with relevant administrative division authorities on the most appropriate date and time of conducting the pilot testing. The information gathered during pilot testing was used to improve the instruments.

3.5.2 Validity of the instruments

According to Best and Kahn (2003), an instrument is valid when it measures what it claims to measure. Kothari, (2004) has it that validity can also be thought of as utility. In other words, validity is the extent to which differences found with a measuring instrument reflect true differences among those being tested. For this study, the

researcher used content validity. The validity of the instruments was determined by the researcher's supervisor. Also Peer review of instruments and use of expert judgment was used to enhance content validity. .

3.5.3 Reliability of the instruments

Grinnell (1993) has it that reliability measures the degree of accuracy in the measurement that an instrument provides. According to Donald, (2006), Mugenda and Mugenda, (2003), research instruments are expected to yield the same results with repeated trials under similar conditions. For them, the instrument returns the same measurements when it is used at different times.

Therefore, in order to determine the consistency of the measuring instrument to return the same measurement when used at different times, the researcher used Test-Retest method to ascertain the reliability of the instrument. This happened during the pilot study, before the actual research was done. Kombo and Tromp (2009) add that reliability is a measure of how consistent the results from a given test are.

3.6 Data Collection Procedure

Madhu, (2005) has it that data collection procedure is the plan for the activities that are involved in a given study. For this study, the researcher was to follow the necessary procedure in obtaining the relevant documents for the study.

The researcher received the permit from the National Council of Science and Technology (NCST) and an introductory letter from the University of Nairobi. On acquisition of the permit, the researcher proceeded to the study area for appointments with farmers and AEOs for data collection which was followed accordingly. There was a covering letter attached to the questionnaire to request the respondents to participate in the study. The AEOs were informed beforehand about the purpose of the study. A total of 370 farmers and AEOs participated in the study and were given the questionnaires. The farmers filled the questionnaires and the researcher collected the completed questionnaires after the distribution and also on the same day for those who had filled it.

3.7 Data Analysis Techniques

This study employed descriptive statistical methods in order to analyze the data that was collected. There was cross checking of the questionnaires to ensure that the questions were answered well. Coding of the answered questions was done, and organization of the whole information done before the analysis of the data. Qualitative data was first divided into themes and sub-themes before being analyzed. In the analysis of the collected data, Statistical Package for Social Sciences (SPSS) was used. Frequency and percentages was used in the analysis and presented in a tabular form to enhance interpretation of the data.

3.8 Ethical Considerations

Information obtained from other sources or from authors to support the relevance of this research was acknowledged in the form of references while plagiarism was minimized as much as possible. The researcher assured the respondents of the confidentiality of the information they provided, including their own personal information. The respondents were informed of the purpose of the study, that is, for academic purposes. This enabled them to provide the required information without any suspicions.

3.9 Operational definition of variables

This is presented in a table (Matrix) form that tries to link the specific objectives of the study with their indicators, data collection instruments and means of analysis. The columns shows the objectives under investigation, source of data to satisfy the given objective, type of information that was sought, data collection instrument, the type of measuring scale that was used and the data analysis techniques used.

Table 3.2 Operationalization of variables

Objectives	Indicator	Data collection instruments	Measuring scale	Analysis
To establish how income from cane supplied to sugar factories improve livelihood of the cane farmers' livelihood.	Returns from cane Use of cane as collateral Importance of cane income Source of family income	Questionnaire Interview schedules	Ordinal	<ul style="list-style-type: none"> • Frequency tables • Percentages
To examine how Sugar factories practices on education improves cane farmers' livelihood in Bungoma East Sub County	School attendance School enrolment Infrastructure in schools Fee payment	Questionnaire Interview schedules	Ordinal	<ul style="list-style-type: none"> • Frequency tables • Percentages
To assess how Sugar factories practices influence improvement of food as a livelihood enhancement of sugarcane farmers	Farm size under cane Overall farm size Millers' contribution to food. Source of family food	Questionnaire Interview schedules	Ordinal	<ul style="list-style-type: none"> • Frequency tables • Percentages

To determine how input by sugar factories influence improvement of cane farmers' livelihood	<p>Infrastructure improvement.</p> <p>Health improvement</p> <p>Water provision</p> <p>Fertilizer costs</p>	<p>Questionnaire</p> <p>Interview schedules</p>	Ordinal	<ul style="list-style-type: none"> • Frequency tables • Percentages

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents findings of the study which have been discussed under thematic subsections in line with the study objectives. The thematic areas include: Questionnaire return rate; Demographic characteristics of the respondents', Income from cane delivered and improvement of farmers livelihood, influence of Sugar factories on education improvement of cane farmers' livelihood, Sugar factories influence on improvement of food security and influence of sugar factories input on improvement of livelihood of sugarcane farmers.

4.2 Questionnaire Return Rate

This study targeted sugarcane farmers and area agricultural extension officers within Bungoma East Sub-county. Questionnaires were distributed to 370 sugarcane farmers and 10 extension workers scheduled for interviews. Of these, 262 farmers responded well while 7 extension officers were available to participate in the interviews. Table 4.1 shows the distribution and return rates of respondents for this study.

Table 4.1 Return rate

Target	Response	Percentage		
Sugarcane farmers	360	262	72.77	
Extension officers	10	7	70.0	
Total	370	269	72.7	

Out of 370 questionnaires and interview schedules administered to the sugarcane farmers and AEOs, 269 were responded to representing a return rate of 72.7% ($269/370 \times 100$). A response rate of 70% is sufficient for one to make generalizations, according to Kothari and Nachmias (2007). Therefore this research attained a response rate of 72.7% which was adequate for generalization of research finding.

4.3 Demographic Characteristics of the Respondents

This section presents the demographic characteristics of the respondent with the aim of establishing the general background of the respondents that participated in the study. The researcher sought to establish the distribution of respondents' by age, sex; and level of education to enable the researcher demonstrate the diversity of the respondents involved in the survey. Respondents' were therefore asked to provide the necessary demographic data of which the results were presented and discussed in the following subsequent sub-themes.

4.3.1 Distribution of Respondents by gender

An item was included in the questionnaire which sought information on the gender of the farmers responding to the survey. The researcher was interested to establish how power dynamics and cultural settings influence women participation in farms and their accessibility to resources such as land.

Table 4.2; Gender

	Frequency	Percentage
Male	190	72.5
Female	72	27.4
Total	262	100

Out of the 262 interviewed, 190 which represented 72.8% were male and 72 which represented 27.41% were female as shown in table 4.2. From the study, it was revealed that there is a slight variation in the composition of farmers by gender.

The study also showed that majority of the sugarcane farmers are male since men are culturally inclined to be decision makers and have greater control in most households in area of study.

4.3.2 Distribution of Respondents by age

This question item sought to find the age distribution of the respondents. Age distribution was to help the researcher to establish which section of the population engages most in sugarcane farming. Table 4.3 summarizes the age distribution of the respondents.

Table 4.3: Age

Age	Frequency	percentage
20-30	6	2.3
30-40	51	19.5
40-50	100	38.2
50-60	63	24.1
60-70	42	16.0
Total	262	100

The table shows between ages 20-30, indicated 2.3%, ages 30-40 indicated 19.5%, ages 40-50 indicated 38.2%, ages 50-60 indicated 24.1% and ages 60-70 indicated 16.0%. The age distribution across the categories is varied though it was shown that most of the sugarcane farmers are advanced in age. The findings reveal that almost half of the respondents are more than 40 years of age at 78.3%. This is because sugarcane growing requires that one has to be officially registered and has the necessary particulars but the younger farmers who do not have land title deeds or have not been assigned by their parents' portions to do farming were not keen on engaging in sugarcane production.

4.3.3 Respondents by education level

This item was included to gauge the level of education the farmers have attained.

Table 4.4 Education level

Level	Frequency	percentage
Primary	145	56.0
Secondary	89	33.3
College	28	10.7
Total	262	100

The table shows 145 representing 56.0% of the farmers have attained primary school education, 89 representing 33.3% secondary education and 28 representing 10.7% have attained college level education. The study revealed that majority of the farmers has attained elementary or basic education. This is sufficient for farming since they can read and write, do simple farming techniques among other tasks.

4.4 Income from cane supplied to sugar factories and improvement of cane farmers' livelihood

This section sought to present findings in an effort to establish the extent to which income from cane supplied to sugar factories by farmers improves their livelihood in Bungoma East sub County. The question items were geared towards eliciting responses that would indicate how income from cane supplied to sugar factories improves of cane farmers' livelihood.

4.4.1 Income earned by farmers' from cane harvested

The study sought to find out the income farmers would get from cane farming in a particular harvesting season. This was necessary in order to ascertain the influence of the sugar factories in improving the livelihood of farmers.

In view of this, respondents were asked to indicate the income earned from the harvested cane. Their responses were as tabulated in Table 4.5.

Table 4.5 Income earned by farmers' from cane harvested

Amount	Frequency	Percentage
Less than 20,000	10	3.82
20,000-50,000	17	6.49
50,000-80,000	69	26.34
80,000-110,000	107	40.84
Above 110,000	59	22.52
Total	262	100

The findings show that 10 respondents representing 3.8% earn less than KSH.20, 000 after cane harvest. 17 respondents representing 6.5% would earn between KSHS. 20,000-50,000 after harvest. 69 respondents representing 26.3% would earn between KSHS 50,000- 80,000 after harvest. 107 respondents representing 40.9% earned between 80,000- 110,000 and 59 respondents representing 22.5% earned above 110,000. From the findings that farmers are able to get some income whenever their cane is harvested by the

sugar factories. Once cane is delivered one is assured of income in the range of between Kshs. 20,000 and above Kshs 110,000 depending on the acreage of the land under cane.

This agrees with Odenya et al. (2009) in a study in Nyando sugar belt which revealed that cane farming is a major source of income to the farmers. In the study, 81.3% of the Nyando farmers derived income from cane farming, 16% from cane farming and business and only 2.7% from employment and other businesses. Ida Lindell & Gustaf

Magnusson Kroon (2010), reveals that the farmers who mainly grew sugarcane generally had higher income (mean: 93000 KShs/ha/year) than the farmers with Agro forestry systems (mean: 63 000 KSh/ha/year). However, it was also observed that the income for the sugarcane farmers was more unevenly distributed throughout the year compared with the Agro forestry farmers.

4.4.3 Duration of cane payment after delivery to millers

The Sugar Act (2001) stipulates that sugarcane farmers should be paid within 30 days (one month) after sugarcane delivery to the factory. To determine the period payment took after cane was delivered an item was included in the questionnaire which read; how long did the sugarcane proceeds take to be paid after harvesting and delivery to the millers?

Table 4.7 Duration of cane proceeds payment after harvesting.

Period of cane proceeds payment	Frequency	percentage
Within 2 Weeks	102	38.93
Within 30 Days	106	40.46
Within 2 Months	24	9.16
After 2 Months	20	7.63
None	10	3.8
Total	262	100

Research findings in Table 4.7 revealed that 102 of respondents representing 38.93% stated that they were paid after 2 weeks, and 106 of the respondents representing 40.46% were paid within 30 days as stipulated by the Sugar Act, 24 respondents representing 9.2% paid within 2 months, 20 respondents representing 7.6% were paid after 2 months. The findings show that prompt payment within the stipulated time frame in the Act by the respective millers encouraged more the cane farmers to grow cane since they were paid on time hence improving their livelihood.

This agrees with the KACC Report (2010) that West and Butali sugar factories were the most efficient in paying the farmers, they paid them a week after supplying cane. It also agrees with the KSB (2010), that in Western Kenya and Nyanza sugar belt, farm households and rural business depend on the injection of funds derived from the sugar industry

4.4.5 Rating of the importance of sugarcane income.

The study sought to find out whether the income received by respondents from the sale of cane would enable them accomplish many of the family obligations like payment of school fees, construction of better shelter, meeting medical expenses and have some fun with their families. The question item read; Indicate below how you spend income from sugarcane farming, indicating the most important priority as no. 5 and the least as no.1. Table 4.9 summarizes the responses from the respondents.

Table 4.9 importance of sugarcane income

Income expenditure	Frequency	Percentage
Paying fees	84	32.06
Invest in business	47	17.94
Buy family land	48	18.32
Build family home	65	24.81
Others	18	6.87

Total

262

100

The findings are: 84 respondents representing 32.0% would pay fees, 47 respondents representing 17.9% would invest in businesses, 48 respondents representing 18.3% would buy family land, 65 respondents representing 24.8% would build homes and 18 respondents representing others were 6.9%. The responses provided indicate that income received from engaging in sugarcane farming was important in accomplishing many tasks in the family. 32.06% of the respondents stated that paying school fees using sugarcane income was most important priority expenditure. Others would buy land, build homes and invest in businesses. Therefore this income enabled the households to uplift their living standards. This agrees with Sorre (2005) that sugarcane income enabled farmers raise sugarcane on both their own farms, leased plots and also enabled them to invest in other businesses. Oniang'o (1987), had it that introduction of sugarcane led to buying of land from non-cane farming families by cane farming families in order to increase their income.

4.4.6 Main source of the income of the family

The study sought to establish the main source of income of the sugarcane farmers in their respective families in order to establish how income from cane supplied to sugar factories influences the improvement of farmers' livelihood. Respondents were asked to give the main source of income of the family. The findings are presented in table 4.10.

4.10 Main source of the income of the family.

Source of income	Frequency	Percentage
Sugarcane farming	96	36.6
Employment	70	26.7
Business	22	8.4
Food crops	61	23.3
Other	13	4.9

Total	262	100
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From the findings in the table 4.10 sugarcane farming played a bigger role to the income of most households. 96 respondents representing 36.64% said Sugarcane farming was source of income of the family income, 70 respondents representing 26.72% had employment, 22 respondents representing 8.4% had business, 61 respondents representing 23.3% had food crops and 13 respondents representing 4.96% had others. This is in agreement with KSI (2010) that the sugar industry supports over 6 million Kenyans and is a major source of income for over 200,000 small-scale farmers who account for 85% of cane supply to the six companies.

4.4.7 Pricing formula of the cane supplied to the sugar factories.

In order to further appreciate the influence of income from cane supplied to sugar factories and how it improves the livelihood of cane farmers' livelihood it was prudent for the researcher to ascertain the pricing formula of the cane supplied to sugar factories. Knowing about it is important to the farmer to enable him/her keep track of the expected income of the cane supplied.

To succeed in this whole course, the researcher inquired from respondents with the question; do you know much about the pricing formula? Respondents made several sentiments as depicted in table 4.11.

Table 4.11 pricing formula of the cane supplied to the sugar factories.

Frequency	Percentage	
Yes	170	64.89
No	80	30.53
Other	12	4.58
Total	262	100

From the findings majority of the 170 respondents representing 64.89% indicated they knew of the pricing formula while 80 respondents representing 30.53% were not aware of the pricing formula. 4.58% could not ascertain of it. Pricing can determine whether farmers will grow cane and it is a motivating factor in the sugar business. This is in agreement with Anwar & Naeem, (2008) that in economic analysis of the farm supply response study, price was a critical economic factor that determined farmers' production decision (Anwar & Naeem, 2008). In Kenya, the sugarcane pricing formula is used to determine the sugarcane price per ton. The pricing formula is recognized in the Sugar Act 2001. Yanagida & Bharti (1990), revealed that official procurement price for sugarcane at mill gate and relative returns to alternative uses of sugarcane were principal factors affecting sugarcane supply.

4.5 Influence of Sugar factories on education improvement of cane farmers' livelihood.

This section sought to present findings in an effort to establish the extent to which the Sugar factories' practices had influenced education of sugarcane farmers' children, in Bungoma East sub County under the following sub themes; School attendance, affordability of education, barriers to school enrolment, challenges facing school drop outs and determinants of low, high school enrolments, fees payment and infrastructure development in schools.

4.5.1 School Attendance

The study sought to find out whether respondents' children were at risk of dropping out from school due to lack of school fees or not. This was necessary in order to establish the influence of the sugar factories on the improvement of livelihood of farmers' children in as far as education is concerned. In view of this, respondents were asked to indicate if their children were at risk of dropping out of school due to lack of school or not. Their responses are presented in Table 4.12.

Table 4.12: Children at risk of dropping out of school due to lack of school fees

Response	Frequency	percentage
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Yes	107	40.8
No	155	59.2
Total	262	100

Of respondents who participated in the study, majority of respondents 59.2% (155) alluded to the fact that their children were not at risk of dropping out of school due to lack of school fees 40.8% (107) of respondents alluded that their children were not at risk of dropping out of school. This implies that the millers in paying farmers on time could facilitate them to pay fees and therefore retain their children in school and factories could review positively their terms of engagement. Only 40.8% of the respondents' were not confident of retaining their children in school. This agrees with Ozturk(2001), that education raises people's productivity and creativity and promotes entrepreneurship and technological advances.

In order to further establish the influence of Sugar factories on the education of farmers' children, a cross tabulation of child/ children at risk of dropping out of school due to lack of fees and rating of the level of satisfaction on what is being offered by the sugar factories was done. The results are as indicated in Table 4.13.

Table 4.13: Child/ Children at risk of dropping out of school due to lack of fees and rating of the level of satisfaction on what is being offered by the sugar factories.

Response	Level of satisfaction on what is offered by the sugar			
	Very satisfied	Satisfied	less satisfied	Total
Yes	Count 8	43	56	107
Percentage	3.0	16.4	21.4	40.8
No	Count 188	45	31	155

Percentage 6.9 32.1 20.1 59.2

Total	26	127	109	262
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Of the respondents who participated in the study, majority 6.9% indicated that they were very much satisfied with what was being offered by the sugar factories, 32.1% of the respondents were satisfied, 20.1% of the respondents were less satisfied. The table 4.13 above shows that majority of the farmers 32.1% who are satisfied also had children not at risk of dropping out of school. Findings of this study insinuate that most sugarcane farmers 32.1% were satisfied with remuneration offered by the Sugar factories in terms of remitting the cash and in reviewing the remuneration to be in tendon with the present economic reality. As a result, majority of the sugarcane farmers were able to sustain their children in school. This is agreement with Miemie(2014) that through farming activities and wage employment it has enabled farmers to pay school fees on time for their children which has seen an increase in school enrolment in the region hence reducing inequality gap. In many developing and in some developed countries, a persistent problem of unequal access to quality education exists. This disparity commonly appears in two categories: based on gender and socioeconomic status.

4.5.2 Affordability of Education

This section presents the influence of Sugar factories practices on affordability of education of sugarcane farmers' children. It was important to establish if the income farmers get from cane farming was reasonable and could enable them send their children to school. For this reason, respondents were asked to rate the cost of affordability of education based on the average income earned from the cane farming. Findings were as illustrated in Table 4.14.

Table 4.14: Rating on affordability of education

Rating	Frequency	Percentage
Very High 55	21	
High	139	53.1
Average	34	13
Low	21	8
Very Low	13	4.9
Total	262	100

The findings show that 21% (55) of the respondents who participated in the study felt that the cost of education was very high. 53.1% (139) held the opinion that the cost of education was high. 13% (34) of the respondents asserted that the cost of education was average while 8% (21) of the respondents indicated that the cost of education was low whereas minority of the respondents 4.9 % (13) had it that the cost of education was very low. From the findings of the study, majority of the sugarcane farmers were burdened by the cost of education since majority of them echoed that the cost of education was very high but could be relieved when sugar companies made payments to the cane supplied. These findings indicate that majority of the sugarcane farmers depended on income from the cane supplied clear school fees of their children.

4.5.3 Enrollment in schools in the region

The researcher wanted to establish the school enrolment in the sugarcane growing areas so as to determine the influence of the sugar factories on the livelihood of sugarcane farmers. The question posed was; Are all of your children at the age of school attend school? Results are tabulated in the table below.

Table 4.15 Children who attend school

	Frequency	percentage
Yes	235	89.7
No	17	6.5
None	10	3.8
Total	262	100

The findings are 235 of respondents representing 89.7% their children attended school, 17 respondents representing 6.5% didn't attend school. From the findings 89.7% of the respondent were in agreement that their children at the school going age attended school/ were at school at any given time. This was in agreement with Kande (2007) who noted that consistent increase in enrolment in private secondary schools is evidence enough that demand for secondary education far outstrip supply and with the introduction of Free Primary Education (FPE) in 2003 and Free Day Secondary Education (FDSE) in 2008, this will even rise to magnitude levels. There is therefore greater need for the government to collaborate with the private sector, civil society and the business community to expand the existing places to improve access to secondary education in Kenya.

4.5.4 Barriers to School Enrolment

The researcher again sought to establish the barriers that hinder the children to school enrolment in order to establish the influence of sugar factories' practices on education of

sugarcane farmers' children. Respondents were asked to state the barriers that hinder children from accessing school. Findings were as presented in Table 4.16.

Table 4.16: Barriers to School Enrolment

	Frequency	Percentage
Accessibility	5	1.9
Lack of finance	42	16
Mentally handicapped	5	1.9
None	17	6.5
Poverty	172	65.6
Unemployment	7	2.7
Lack of role model	14	5.3
Total	262	100

Out of 262 respondents who took part in the study, examination of the Probe on the barriers to school enrolment revealed that 65.6% of the respondents' were not able to enroll their children to school due to poverty, 1.9% cited accessibility, 16% lack of finance, 1.9% disability, 6.5% none, 2.7% unemployment and 5.3% lack of role model. The highest number, 65.6% of the farmers' sighted poverty as a limiting factor to school enrolment. Poverty constraints could be attributed to many factors which are varied like ignorance (lack of access to information), cultural practices, rural to urban migration and lack of infrastructure. From the report of CBS Poverty incidence is higher in the entire

County than the national average of 53% (CBS 2006). The issue of CRS come in where as per the copy of Daily Nation 12th (2011), in 2010, the Equity Group Foundation (of Equity Bank) under its corporate responsibility programme partnered with the MasterCard Foundation to launch a 9-year Shs.4 billion comprehensive secondary school education fund to assist academically gifted students from poor backgrounds to pursue secondary education. In 2011, the programme received support from UKaid, the Wings to fly programme, which extended scholarships to 1,200 students who performed well in the 2010 K.C.P.E but who come from poor backgrounds. The Wings to Fly programme hopes to reach 5,600 deserving children.

4.5.5 Role of sugar factories in improving infrastructure development in schools.

The study went further to investigate the involvement of Sugar factories in improving infrastructure development in schools to establish their role in improving farmers' livelihood in Bungoma East Sub County. An item was included in the questionnaires which sought information in ways through which the sugar factories improves infrastructure development. The question posed was; do the sugar factories assist in any way in improving infrastructure development in schools? The findings are presented in the table below.

Table 4.17: Infrastructure improvement in schools

Response	Frequency	Percentage
Yes	186	71.0
No	45	17.2
Not aware	31	11.8
Total	262	100

In the findings 186 respondents 71.0% agreed there was funding, 45 representing 17.2% did not agree while 31 representing 11.8% purported to be not aware. The research established that 71.0% who purported to the fact that schools had received support to set

up physical facilities in their respective schools from the sugar factories. The revelation urges the need to engage public- private partnership in the development of education in the region in line with Jha, S. and Chatterjee, S., (2005) who observed that appropriate inputs from both the private and public sectors are enormous resources and opportunities that can be put at the disposal of the education systems so as to expand access to and quality of education. The companies had also corporate social responsibility policy that focuses not only on education but also on health, infrastructure, environment, water among others.

4.5.6 Facilities repaired/maintained by factories to Enhance Teaching/Learning in the Schools

In a bid to establish the specific contribution of Sugar Companies' towards development of education and support of schools for the last five years, an item was included in the questionnaire which asked the respondent to list the facilities provided/maintained by the companies'. In response, Table 4.18 presents the results.

Table 4.18: Facilities repaired by the Companies

Facilities	Frequency	Percentage
Painting Classrooms	64	24.4
Repair of Classroom floors	31	11.8
Repair of Classroom roof	9	3.4
Painting of Administration block	63	24.0
Furniture repair	55	21.0
Kitchen	16	6.2
School Fence	24	9.2
Total	262	100

The Sugar factories supported most schools like 24.4% by painting their administration blocks followed by 21.0% by doing furniture repair, 11.8% repairing their class floors, 3.4% by repair of classroom roof, 24.4% by painting classrooms, 6.2% kitchen repair and 9.2% by doing school fence and maintenance of school infrastructure which lightened the burden to the parents. The above findings similarly are in line with the Kenya Airways (KQ) CSR, Kivuitu et al (2005) as well as AKDN activities in Afghanistan, Shakil (2003). In 2008, Kenya Airways helped in the renovations of 14 classrooms and administration block of Farasi Lane Primary School located in Lower Kabete, Nairobi. It also helped in replacing windows and doors, painting and plastering of walls and in addition new floors were constructed and the entire school was painted. The technical team donated used furniture.

4.5.7 Items Donated by the factories to Enhance Teaching/Learning in the Schools

This section also sought to establish the various items donated by the sugar Companies that may Enhance Teaching/Learning in the Schools in the region. The findings are presented in the table below.

Table 4.19: Donations by the Companies' to Schools

Item	Frequency	Percentage
Textbooks	24	9.1
Lab Chemicals	18	6.9
Furniture	55	20.8
Computers	9	3.5
Games equipment	107	40.8
Other stationary	8	3.1
None	41	15.8
Total	262	100

In the Table 4.19 we get 24 respondents representing 9.1% having received textbooks donations, 6.9% (18) received lab chemicals, 20.8% (55) received furniture, 3.5% (9) received computers, 40.8% (107) received games equipment, 3.1% (8) received other stationery and 15.8% (41) had none. This shows that majority of schools, 40.8% received games equipment as donations from the companies, followed closely by 20.8% who received furniture materials. This confirms the earlier finding that same schools had received some contribution from the Companies. This is in line with Jha, S. & Chatterjee, S., (2005) that with appropriate inputs from both the private and public sectors, enormous resources and opportunities can be put at the disposal of the education system.

4.6 Sugar factories influence on improvement of food security as a livelihood enhancement of sugarcane farmers.

The study sought to obtain general sugarcane farmers' views of the influence of the Sugar factories influence on their food security since this could provide a basis for important research conclusions and recommendations. The research findings were presented and discussed under the following sub themes: Farm size under cane, overall farm size, household food availability and crop diversification.

4.6.1 Respondents' overall farm size

The study found it important to establish the overall farm size owned by the sugarcane farmers with an aim to determine if the farm size could meet other activities that could generate food together with cane farming. The findings are presented in the table below.

Table 4.20 overall farm size

Size	Frequency	Percentage
Less than 1	58	22.1
1-3	88	33.6
3-5	87	33.2
5 and above	29	11.1

Total**262****100**

The table 4.20 shows the farm sizes in acres owned by the sugarcane farmers, 22.1% sugarcane farmers have less than 1 acre, 33.6% sugarcane farmers had between 1-3 acres of land, 33.2% have 3-5 acres and 11.1% indicated to own more than five acres of land. The study revealed that majority of people own small pieces of land. This may be due to overpopulation among other factors that are overstressing land ownership. Most farmers could lease land to plant cane size the farm size they owned couldn't meet the farming activities of both cane and other food crop farming. This agrees with Langat et al (2011), that among smallholder tea farms in Nandi South, Kenya, an increase in the ratio of land allocated to tea to that allocated to maize was associated with greater food diversity score. This was attributed to the income from tea realized throughout the year, which ensured household access to quality food.

The study also sought to establish the size of land under sugarcane farming by the respective respondents. Table 4.20 summarizes the responses from the respondents.

Table 4.21: Acres under sugarcane per individual farmer

Size	Frequency	Percentage
Less than 1	125	47.3
1-3	107	39.7
3-5	30	9.9
5 and above	12	3.1
Total	262	100

From the study 47.3% have less than 1 acre of land under sugarcane farming, 38.7% have between 1-3 acres of land under sugarcane, 9.8% have between 3-5 acres and 3.1% of the respondents have above 5 acres of their land put under sugarcane growing. It shows that sugarcane production competes with food crops for available land. It agrees with Kirimi

et al (2013) has it that innovations that enhance households' access to land, education, savings and employment can be instrumental in raising their ability to produce food and access it from the market, ensuring food security.

The study also sought to establish the size of land under food crops per individual farmer since under cane contract farming; one of the management's responsibilities is to address farmers' food security. Table 4.22 summarizes the responses from the respondents.

Table 4.22 Acres under food crops per individual farmer.

Size of land	Frequency	Percentage
Less than 1	92	35.1
1-3	64	24.5
3-5	45	17.3
5 and above	41	15.6
Missing	20	7.5
Total	262	100

Table 4.22 shows that 24.5% of the respondents had acres of between 1 and 3 acres under food crops, 35.1% had less than 1, 17.3%, 3-5 and 15.6% have above 5. From the two tables, more farmers have dedicated more of the available land to sugarcane production compared to food. The research findings depict that more farmers have less than one acre of their land under food crop production, and hence food from that area is not adequate to feed their family. During the interview with the farmers, it came out clearly that some had to source some food from the markets or relatives to satisfy the family requirements. Also, Kennedy and Cogill (1987) showed that income from cash crops control by women was associated with improved child nutritional status, suggesting that women were more likely to spend more on food and health care. According to these authors, a 1% increase in sugarcane income in South Nyanza District in Kenya resulted in an increase in energy intake of 24 kilocalories per household per day. On average, sugarcane production

increased household income by 15% which increased household energy intake by 360 kilocalories per day, or approximately 33 kilocalories per day per person in the household.

4.6.2 Sugar factory management advice to farmers’ to leave a third of total land area for food crop production

This section sought to find out during land selection exercise for contract cane farming whether staff from the sugar factories advised farmers’ to leave out a third of their land holding for food crop production. The question item therefore read; in what ways has the sugar millers’ management contributed towards achieving food security in your family? Table 4.23 summarizes the responses from the respondents.

Table 4.23: Advice to leave a third of land for food crop production

Frequency	Percentage	
Yes	166	63.2
No	86	33.0
Missing	10	3.8
Total	262	100

The findings in table 4.23 indicate that 63.2% of the valid respondents agreed that they were advised while 33.0% farmers declined that they were advised by the sugar factories’ extension officers. From findings also revealed that the sugar factories management had carried out her managerial role of communicating to the farmers the importance of food security by advising the farmers to leave land for food production and education on food security. According to the sugarcane farming, factories have also a responsibility of educating farmers on food security during the extension meetings. However studies by Mwadhili (1995) concluded that introduction of sugarcane contract farming negatively affected food production. NSC sugarcane contract has a clause that recommends a third

of the farmers land to remain for food production while the rest be used for sugarcane farming. This aptly agrees with A Global Food Crisis and Fair trade report (2009) that has it that a focus on small farmers must be at the centre of any serious strategy to tackle poverty and increase food security and productivity because: Such a focus would reduce poverty because Small farms are home to two billion poor people and they play major social roles, providing safety nets or subsistence living for the rural poor.

4.6.3 Effect of sugarcane management on food availability

The study also sought to understand effect of sugarcane management on food security. The questions item that read; how has the management of sugarcane farming affected food availability in your family over the years? Research findings are presented in table 4.24.

Table 4.24: Effect of sugarcane management on food availability

Effect of food security	Frequency	percentage
Positively (increased food)	84	32.1
Negatively (reduced food)	143	54.7
No change at all	20	7.5
Not aware	15	5.7
Total	262	100

Research findings in table 4.24 reveal that contracted sugarcane production had negative impact on food production in the family. From the table 143 respondents representing 54.7% indicated food availability had reduced while 54 respondents representing 32.1% revealed that sugarcane production led to increased food availability, 20 respondents representing 7.5% said no change took place and 15 respondents representing 5.7% were not aware. The negative impact findings agree with Mwachili (1995) who reported that introduction of sugarcane contract farming negatively affected food crop production. Also it should be noted that more than 800 million people globally suffer from food

insecurity (FAO, 2007). Out of the 800 million, some two-thirds live in rural areas of developing countries(Kohlmeyer, 2003).

4.6.4 Ways through which sugar factories’ management has contributed towards achieving food security to farmers.

This section looks at ways in which the sugar factories have contributed to achieving food security of the farmers. The sections include; provision of diary animals, providing maize/beans and educating farmers on food security.

4.6.4.1 Sugar factories addressing food security by education the farmers

The section looks at the role the sugar factories play in addressing food security by educating the farmers on importance of diversification. According to the sugarcane farming, millers have a responsibility of educating farmers on food security during the extension meetings. Findings are tabulated in the table below.

Table 4.25: Addressing food security by education

Advice on food security	Frequency	Percentage
Less frequent	76	29.1
Frequent	153	58.2
Moderately	10	3.8
Most frequent	23	8.9
Total	262	100

Findings in table 4.25 above indicate that 58.2% of the respondents said that it’s frequently handled, 29.1% indicated it’s less frequently handled, 3.8% indicated its moderately addressed and 8.9% indicated its most frequently addressed. Education to farmers should be frequently handled to ensure food availability to the cane farmers.A

study by Wawire et al., (2002); Odenya et al (2008) revealed that as household increases, there was a general trend of land diminishing. The study in Nyando region revealed that the average family size of 4 persons reside on 2 acres of land hence in -adequate land for sugarcane and food production therefore an urge to sensitize farmers on need to diversify.

4.6.4.2 Addressing food insecurity on providing dairy animals

Another of the sugar factories obligations in handling food security is by providing dairy animals and grains (beans & maize) by using sugarcane as collateral. Table 4.26 and 4.27 indicate respondents result on sugar factories' provision of those inputs.

Table 4.26: sugar factories addressing food insecurity on providing dairy animals

Provision of diary animals	Frequency	Percentage
Less frequent	104	39.6
Frequent	30	11.3
Most frequent	39	15.1
None	89	34.0
Total	262	100

Table 4.26 shows that 39.6% of the respondents were of the view that, factories' management less frequently provided dairy animals, 15.1% they most frequently provided dairy animals, 11.3% indicated they frequently provided and 34.0% indicated they were not aware of any provision of diary animals. This aptly agrees with Kirimi et al (2013), who suggests that facilitating the expansion of market participation by smallholder farmers can be critical in helping households transition out of food poverty. This will entail enabling access to production inputs, which are both affordable and suitable to small scale farmers, thus ensuring that farmers are not trapped in low productivity–low return farming activities that lead to food insecurity.

4.27: Addressing food insecurity by providing maize/bean seeds

Providing seeds	Frequency	Percentage
Less frequently	128	49.1
Frequent	5	1.9
Most frequent	94	35.8
None	35	13.2
Total	262	100

Research findings in table 4.27 revealed that the factories less frequently 49.1% (128) addressed food security by providing maize/beans to farmers, 35.8% (94) of the respondents indicated that they most frequently addressed food security, 1.9% (5) respondents indicated that they frequently addressed food insecurity and 13.2% (35) were not aware of any provision. The findings reveals that sugar factories management had not effectively implemented the policy on support to farmers by providing the grains (beans & maize). The findings revealed that sugarcane farming negatively affected food production and hence reduced food availability to the household. The low availability of food had negative impact on sugarcane farming as revealed by the study.

4.6.5 The source of food to the sugar cane farmers

This section looks at the source of the sugar cane farmers to ascertain the effect of sugarcane farming on food security. An item that read, 'Rank the source of food to your family' was included in the questionnaire. Findings are presented in the table below.

Table 4.28: Source of food to the sugar cane farmers

Source of food	Frequency	Percentage
Fully production from farm	148	56.5
Buy from market	85	32.3
Borrow from relatives/neighbors	20	7.7
Sleep hungry	9	3.5
Total	262	100

The table 4.28 shows that majority of the respondents 56.5% (148) would get their food from farm, 32.3% (32.3) indicated that they would buy from market, 7.7% (20) indicated that they borrow from the relatives and neighbors while 3.5% (9) indicated they sleep hungry. This implies that apart from growing cane, farmers can also chose to engage in the farming of the main cereal crops such as maize, beans, sorghum and millet with intention of not only for food but also earning cash from their sale, which agrees withLangat et al (2011), who found out found that among smallholder tea farms in Nandi South, Kenya, an increase in the ratio of land allocated to tea to that allocated to maize was associated with greater food diversity score.

4.7influence of Sugar factories input in improvement of Livelihood of cane farmers

The last objective of the study was to determine how sugar factories input influence the improvement of livelihood of cane farmers.Since input is important in improving the livelihood of people the researcher felt that it was prudent to ascertain whether the sugar factories input influences the improvement of farmers' lives. In order to achieve this, the researcher looked at different aspects of input.

4.7.1 Infrastructure improvement

This section looks at the different infrastructural development as input of the sugar factories, so as to determine the influence of input of factories in relation to cane farming in the improvement of farmers' livelihood. The factories played the following roles as their input is concerned;

4.7.1.1 Improving road network in the region.

The section looks at improvement of infrastructure and communication in the study area to see any change of live livelihood pattern and how it affects households. Findings are presented in the table below.

Table 4.29: Improvement of road network in the region

Improvement of road network	Frequency	Percentage
Yes	15559.1	
No	7628.9	
None	31	12
Total	262	100

Findings indicate that 59.1% of respondents were in agreement that roads had improved 28.9% had it that, they had not improved while 12.0% didn't indicate anything. This is a positive change in the study area where the physical capital such as roads and means of transportation are essential to diffuse knowledge and technology, which facilitate the development of communities, also the construction and development of roads and communication networks enhances the proper and fast marketing of farm produce and also the movement of rural people for other activities, even off-farm activities.

4.7.1.2 Access to information in relation to the operations of the sugar factories

The researcher was then interested to find out how access to information has improved with the presence of the sugar factories operations in the study area. An item that read 'Has the access to information improved in relation to the operations of the sugar

factories in your area?’ was included in the questionnaire. Findings are presented in the table below.

Table 4.30: Access to get information and news

Access to information	Frequency	Percentage
Fully access and satisfaction	175	66.7
Partial access	76	28.9
No access and satisfaction	11	4.4
Total	262	100

From the findings 66.7% of head of households agreed that they have full access and full satisfaction with reliability of information rather than before companies’ operations. 28.9% had partial access to information while 4.4% had no access and were neither satisfied. This agrees with Robert Chapman ad et al, (2005) that, Communication can help in access to markets and market information, helps to improve choices for the sale of goods on local markets according to enhanced information on prices and comparative supply and demand for products. In the longer term new markets, techniques and processes for production, processing and marketing of products; both farm and nonfarm can be explored.

4.7.1.3 Source of water/provision

The section looks at the source of water of the sugar cane farmers in the area of study and what the factories have done to improve the situation. Water is a natural asset that is important in the improvement of the livelihood of farmers’ lives. Scarcity of water deteriorates the living conditions of people hindering their livelihood operations. Findings are presented in the table below.

Table 4.31 source of water

Source	Frequency	Percentage
Rain	34	13.0
Spring	113	43.3
Borehole	105	40.3
Tap	11	5.4
Total	262	100

From the results 13% their main source was rain water, 43.3% was village spring, 40.3% was borehole sunk while 5.4% was tap water. According to the accessibility and consumption of water, most of farmers, reported that, they had full access to source of water, water is available all day in their home or through tanker services. Access to water plays a key role in development; it sustains human life, both through direct consumption and use in agriculture (for food security) and industrial activities. While water availability for drinking proposes is essential, it cannot be separated from wider water resource management issues, also increased access to safe drinking water results in improved health outcomes in the form of reduced cases of water-borne diseases.

4.7.1.4 Material that used of residence of the sugarcane farmers

In order to fully appreciate the conditions of residence occupied by sugarcane farmers, the researcher examined the condition and materials that is used to make the residence. In lieu of this, respondents were asked to give the materials that are used to make their residence. Findings were as illustrated in Table 4.32

Table 4.32: Material that used of residence

Material	Frequency	Percentage
Mud +iron sheets	154	58.7
Cement	27	10.4
Mud + bricks	81	30.9
Total	262	100

The findings shows that 58.7% (154) of households their houses built from mud with iron sheets, 30.9 % (81) were built from mud and 10.4% (9 27) were built from cement with public electricity and water facility. This meant that there were significant changes that happened after farmers began engaging in cane farming, first at livelihood patterns, households were change into permanent settlement, second, change in material of building. This indicated that there was improvement in the economic status and standard of living. This was supported by Ellis, (2000), where rural households have a preference for cement brick houses and that housing styles are an indication of socio-economic status.

4.7.2 Extension services as an input of sugar factories

Provision of Extension services by extension staff has a direct bearing on crop productivity. This sub-section seeks to find out the influence of these services on sugarcane production by farmers. Extension services are a communication tool under the various managerial functions of an organization. Communication is an important managerial function and is responsible 60% of the management problems as stated by Drucker (2008).

4.7.2.1 Operations advised by factories extension staff

The section looks at the operations of cane management as advised by factories extension staff as an input in the area of study and what the factories have done to improve the situation so as to enhance productivity in order to improve on the livelihood of farmers. Table below shows the findings;

Table 4.33: Operations advised by extension staff

Type of service	Frequency	percentage
Planting of cane	98	37.4
Fertilizer application	80	30.5
Weeding of cane	54	20.6
Trash lining	30	11.4
Total	262	100

Research findings in table 4.33 revealed that the respondents received advice on the following activities; 20.6 % on weeding of sugarcane, 37.4% on planting of sugarcane, 30.5% on fertilizer application and 11.4% on trash lining.

The implementation of these activities i.e. proper planting, fertilizer application, timely weeding and trash lining determine yield in sugarcane, therefore they are key in sugarcane production. Therefore the extension officer must have expert power to be able to pass professional knowledge to the farmers. Nuthall & Padilla (2009) in their study found out that extension education was an effective way of improving technical efficiency in the production of sugar-cane in Philippines. They recommended targeting of farmers with long farming experience and young farmers who lacked farming experience. Training of farmers can take place through routine farm inspection visits by extension staff, formal and regular meetings with farmer groups that concentrate on the relevant activity at the time, e.g. seed sowing, transplanting, fertilizing, pest and disease control or harvesting (Swanson & Claar, 1984).

4.7.2.2 Appropriate extension method for improving sugarcane productivity

The section looks at the different extension methods that farmers feel are appropriate for improving sugarcane productivity.

Table 4.34 Appropriate Extension method

	Frequency	percentage
Farm visits by employees	114	43.5
Extension meetings	80	30.6
Visit contact farmers	28	10.5
Classroom training	25	9.7
None	15	5.7
Total	262	100

Respondents revealed that the different methods were effective in the order of: 43.5% on farm visits by millers' employees, 30.5% on extension meetings, 10.5% on visit of contact farmers and 9.7% on classroom training. From the research finding, the most appropriate extension method is farm visits by employees followed by extension meetings. The least appropriate is classroom training

This agrees with FAO (2010) that the introduction of technologies by field extension staff can cause cultural adaptation problems for small-scale farmers. Therefore management can organize training programmes for extension staff and farmers in the form of regular lectures, field days and demonstration plots. These has been done in South Nyanza Sugar

Company (SONY) which promotes farmer training programmes and organized field days to demonstrate sugar-cane production methods to farmers.

4.7.2.3 Level of technology adoption by farmers.

The section looks at the level of technology adoption that farmers feel are appropriate for improving sugarcane productivity. The respondents were asked if they had adopted any new technology released by millers in the past five years. The findings are presented in the table below;

Table 4.35 Farmers adoption new technology.

Adoption of technology	Frequency	Percentage
Yes	43	16.6
No	204	77.6
None	15	5.8
Total	262	100

Table 4.35 has the results, 43(16.6%) of the respondents have adopted new technology while 204(77.6%) have not adopted new technology. The respondents had various reasons why they had not adopted new technology. The most cited reason was that new technology was expensive. Other reasons included lack of knowledge by both the staff and farmers (not aware), lack of skills to execute (herbicide spraying), and the materials are not available. FAO (2013) has it that in Ethiopia for example in addressing the challenges of sugar industry to expand production, it is implementing an ambitious plan, through the ESC, to more than double production by expanding the cultivated land area and improving production infrastructure (dams, plant renovation).

4.7.3 Agricultural inputs

This section attempts to look at the extent to which the agricultural inputs by the sugar factories influence the improvement of farmers' livelihood. The question items were

geared towards eliciting responses that would indicate how the input by the factories influences sugarcane farming. The tables presents the responses to various items, their frequency and percentages.

4.7.3.1 Sugarcane transportation to the factory

Table 4.36 shows who caters for the transport of sugarcane to the factory after harvesting.

Table 4.36 Transportation to the factory

Frequency	Percentage	
Farmer	17	6.4
Sugar factory	232	88.7
None	13	4.9
Total	262	100

From table 4.36, the study revealed 232 which represent 88.7% of respondents agreed that it is the company that caters for cane transportation to the factory. Only 17 or 6.4% indicated to be making separate individual arrangements to have their canes delivered at the factory while 13 or 4.9% did not respond to this item. Cane transport is the highest production cost across all zones, ranging from 23-42% of total production cost. High transport costs are as a result of poor roads which lead to a high rate of breakage of the transport units and hence a high frequency of replacement of spare parts. Tyres and tubes also wear out faster and they have to be replaced. Spare parts, tyres, tubes and other inputs are costly, hence increasing the transport costs.

Farmers should be assisted in all matters related to production and operation including assisting farmers to get required loans to carry out field operations and purchase inputs and negotiate cane pricing as well as cane harvesting and transportation contracts with millers. Effort to be considered to ensure timely payment to farmers on delivered cane.

4.7.3.2 Supply of cane seeds for planting

This section sought to find out whether the sugar factories supplies the respondents with cane seed for planting.

Table 4.37; Does the company supply canes for planting?

Response	Frequency	Percentage
Yes	231	88.1
No	21	8.0
No response	10	3.8
Total	262	100

On whether the company supplies the respondents with canes for planting, 231 or 88.1% of the respondents reported that the company supplied them with canes for planting, with 21 or 8.0 reporting they did not receive. 5.3 did not respond to the item as shown in table 4.37. The plan for availing seed cane should be well done and B-nurseries be available. It emerged that when the seed canes is poor, then there is a poor crop for the next 5 years. (KESREF 2006).

4.7.3.3 Supplier of fertilizer

This study sought to determine who supplies the farmers with fertilizer.

Table 4.38; Who supplies fertilizer?

Response	Frequency	Percentage
Company	189	72.3
Myself	70	26.7
Don't know	1	0.3
No response	2	0.7

Total	262	100
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To find out who supplies fertilizer to the farmers, again an overwhelming majority of 2.3% reported to receive fertilizer from the company and only 26.7% could buy on their own. Sugarcane production costs in the Kenyan sugar industry with fertilizers and herbicides inclusive, have been increasing over time, in addition to processing costs. The result is high domestic sugar price in comparison to other sugar producing countries, thereby making Kenyan sugar non-competitive. This has led to reduced farmers' profits, a reason for some of them not paying much attention to cane management, and in turn resulting into low quality cane. Kenya is currently under a reprieve where the deficit sugar imported from COMESA countries has a zero-rated tax which is set to expire in February 2008. The production costs therefore, need to be reduced to make domestic sugar cheaper and hence competitive, (KESREF 2006). Fertilizers should be made affordable to increase ratoonnability. This will increase yields thereby reducing costs. Bulk purchasing of fertilizers by KSB through direct importing for the sugar industry would reduce their cost.

4.7.3.4 The quality of prepared land

The study sought to determine the difference in quality of land prepared by either the company or by the farmer him/herself.

Table 4.39; considering land prepared by the factories or by you, which one is best done

Response	Frequency	Percentage
By company	232	88.2
By Self	5	1.9
No response	16	6.1

Total

262

100

On land preparation, 88.2% preferred the preparations to be done by the company while only 5.7% preferred themselves.

Those who preferred preparations by the company reported that the company uses tractors hence faster preparation and payment will be done through deduction upon harvesting of the canes hence increasing productivity. This agrees with Waswa, et al., (2012) who have the view that input costs influence the net income of the sugarcane farmers. This is because the more input costs are put in the farming activity correctly, the more the income is attained by the farmers.

4.7.4 Environmental initiative by the sugar factories.

This section attempted to look at the involvement of Sugar factories in the environmental initiative so as to influence the improvement of farmers' livelihood.

4.7.4.1 Factories role in conserving the environment.

The section looks at role of the factories in enhancing and conserving the environment as a basis of influencing the improvement of cane farmers' livelihood. A question on the role of factories in improving environment was included. Findings are presented in the table below.

Table 4.40 Environmental conservation

Frequency	Percentage	
Provision of seedlings	88	33.6
Outreach programs	76	29.0
Other	79	30.2
None	19	7.2

Total	262	100
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The findings show that 33.6% indicated of provision of seedlings, 29.0% through outreach programmes, 30.2% indicated other while 7.2% were not aware. Communities need to be encouraged to engage in reforestation, water conservation and diversification. These initiatives can be driven by the companies, but must be implemented by the communities to enhance ownership and sustainability. The industries organizations have the technology and resources to support environmental initiatives through capacity building and awareness raising campaigns. Some companies have developed interactive and accessible environmental programs that explain the industry and stakeholder roles in protecting the environment, whilst at the same time explaining the operations of the sugar industry.

4.7.4.2 Diversification with agroforestry as a measure to curb environmental degradation.

Because of this, the high growth rate of the population and the economic dependence on agriculture, large areas in Kenya have been deforested. One way to reconstruct the ecosystem and compensate for the loss of resources is to design farming systems that can help safeguard these demands, *e.g.* agroforestry systems. This section looks at the role played by the sugar factories in addressing this issue through encouraging farmers to engage in agroforestry.

Table 4.41 Agroforestry as a measure to environmental degradation

Response	Frequency	Percentage
Yes	95	36.2
No	125	47.7
Not aware	42	16.0
Total	262	100

On land agroforestry, 36.2% reported the input of the factories in encouraging agroforestry, 47.7% reported of no input while 16.0% did not report anything. Agroforestry need to be encouraged since according to Lwakuba *et al.* (2003) the systems tend to give a large diversity of products on the farm. It also showed that a more diverse system improved the productivity of the soil and gave opportunities to sell some excessive products and obtain extra income.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter covers summary of the findings, discussion of results and conclusions drawn from the study as well as recommendations based on the study findings and suggestions for further

5.2 Summary of Findings

The study sought to find out the influence of sugar factories on the improvement of cane farmers' livelihood in Bungoma East Sub County. The study revealed that Bungoma East Sub County was comparatively densely populated with sugarcane farmers than other regions within the County. Majority of sugarcane farmers were aged between 40-50 years representing 38.2%. The study established that sugarcane farmers were male dominated with 72.8% of the farmers being males. Majority of the cane farmers had attained the secondary school level of education 55.9%. This level of education supported them on utilization of modern technology while carrying out sugarcane farming.

From the study farmers are able to get some income whenever their cane is harvested and delivered to the sugar factories and the income will vary depending on the acreage of the land that was under cane. Also income received from engaging in sugarcane farming accomplished many tasks in the family. 32.06% of the respondents stated that paying school fees using sugarcane income was most important priority expenditure. The income enabled the households to uplift their living standards. The findings shows that prompt payment within the stipulated time frame in the Act by the respective millers encouraged more the cane farmers to grow cane since they were paid on time hence improving their livelihood. This is where 38.93% of the respondents stated that they were paid after 2 weeks, and 40.46% within 30days as stipulated by the Sugar Act. Prompt payment within

the stipulated time frame in the Act by the respective millers encouraged more the cane farmers to grow cane since they were paid on time hence improving their livelihood

On education, majority of farmers 59.2% alluded to the fact that their children were not at risk of dropping out of school due to lack of school fees. This implies that the millers in paying farmers on time could facilitate the retention of children in school and were able to get collateral of the cane supplied to pay fees in case payment delayed. From the study it came out that the cost of education was very high where 53.1% of the farmers held the opinion that the cost of education was high while 13% of the farmers asserted that the cost of education was average. On school enrollment, 89.7% of the farmers were in agreement that their children at the school going age, attended school/ were at school at any given time. On barriers to school enrolment, the study revealed that 65.6% of the respondents' were not able to enroll their children to school due to poverty. The highest number of the farmers' sighted poverty as a limiting factor. The research established that 71.0% purported to the fact that schools had received support to set up physical facilities in their respective schools from the sugar factories.

The study looked at ownership of land to ascertain the effect of cane farming on food security. It came out that majority of people own small pieces of land, where 33.6% sugarcane farmers had between 1-3 acres of land, and 33.2% had 3-5 acres. This was due to overpopulation among other factors that was overstretching land ownership an indication that sugarcane production competed with food crops for available land.

The study found out that, more farmers have less than one acre of their land under food crop production, where 35.1% had less than 1 acre hence making food from the farm not be adequate to feed their family. During the interview with the farmers, it came out clearly that some had to source some food from the markets or relatives to satisfy the family requirements. On the advice by the millers to leave a third of the land for food crops 63.2% of the farmers agreed that they were advised while 33.0% farmers declined that they were advised by the sugar factories' staff but didn't put into consideration. According to the sugarcane farming, factories have also a responsibility of educating farmers on food security during the extension meetings. The study revealed that contracted sugarcane production had negative impact on food production in the family

since 54.7% of the respondents indicated food availability had reduced with 32.1% revealing that sugarcane production led to increased food availability. Also it came out that the sugar factories management less frequently provided dairy animals and maize/beans in addressing food security so as to cushion farmers.

As for inputs from factories there was infrastructural development like of 59.1% of respondents were in agreement that roads had improved. Roads and means of transportation are essential to diffuse knowledge and technology, which facilitate the development of communities. The construction and development of roads and communication networks enhances the proper and fast marketing of farm produce. On access to information 66.7% of head of households agreed that they have full access and full satisfaction with reliability of information rather than before factories' operations.

According to the accessibility and consumption of water, most of farmers, reported that, they had full access to source of water, water is available all day in their home or through tanker services. Access to water plays a key role in development; it sustains human life, both through direct consumption and use in agriculture (for food security) and industrial activities. While water availability for drinking purposes is essential, it cannot be separated from wider water resource management issues, also increased access to safe drinking water results in improved health outcomes in the form of reduced cases of water-borne diseases

Extension services like advice on proper planting, fertilizer application, timely weeding and trash lining were provided which assisted to improve yields in sugarcane.

Respondents revealed that the different methods were effective with 43.5% reporting that on farm visits by millers' employees was most preferable. It came out that farmers have not adopted new technology. The respondents had various reasons why they had not adopted new technology. The most cited reason was that new technology was expensive.

5.3 Conclusion

About 95% of sugarcane supplied to mills in the traditional sugar belt is harvested from farmers' plots and the revenue generated sustains the livelihood of thousands of families

in rural areas. Farmers get some income whenever their cane is harvested and delivered to the sugar factories and the income varies depending on the acreage of the land that is under cane. The income received from engaging in sugarcane farming accomplished many tasks in the family like paying school fees uplifting their living standards. Some factories will pay farmers within the stipulated time frame in the Sugar Act and this could encourage farmers to grow cane since they could be paid.

Moreover, it is found that education status in the study area has been strongly improved, as whole generation of children has been enrolled in different schools and the rate of educated people has become high. Farmers' children were not at risk of dropping out of school due to lack of school fees. This implies that the millers in paying farmers on time could facilitate the retention of children in school and were able to get collateral of the cane supplied to pay fees in case payment delayed. The cost of education was considered to be from secondary to tertiary being attributed on poverty. Schools also had received support to set up physical facilities and some donations.

On food security it's found that cane farming affects farmers since many have less than one acre of their land under food crop production. Farmers could source some food from the markets or relatives to satisfy the family requirements. Millers would frequently advise farmers to leave a third of the land for food crops but many didn't put the advice into consideration. According to the sugarcane farming, factories have also a responsibility of educating farmers on food security during the extension meetings. Contracted sugarcane production had negative impact on food production to most of the households. Also it came out that the sugar factories management didn't provide dairy animals and maize/beans in addressing food security so as to cushion farmers.

It came out that; cane that factories had influenced through various input the improvement of lives of cane farmers. Infrastructure had improved like good road networks maintained by the factories. Agricultural inputs were given to farmers like seeds fertilizer and transportation of cane to factories. Extension services and environmental initiative had also been taken into consideration. Farmers had access to clean water and accessibility to places was made possible with improved network.

5.4 Recommendations

1. Over reliance on money from sugarcane harvest is affecting the living standard of farmers' who must be encouraged to give as much attention to other farming activities such as animal production and the cultivation of food and cash crops in a way that sugarcane becomes a part of the cropping system not its core. To enhance competitiveness of the sugar sector, the GOK should focus on the following areas: Privatizing the government-owned sugar mills; Facilitating access of credit to farmers for enhanced cane development from the Sugar Development Fund; Supporting sugarcane research and availability of early maturing, high sucrose varieties; and creating conducive policy environment for production and use of biofuels.
2. Sugar factories should improve payment per tonnage offered to the sugarcane farmers and of release the cash in time to enable the cane farmers to send and sustain their children in school by paying school fees in time. The companies should set up a scholarship/sponsorship scheme for bright but financially disadvantaged children and all education stakeholders in the County to work closely with the companies to ensure that only genuine and deserving students benefit from the scheme. The companies should enhance the marketing of its sugar so as to generate more revenues and in turn increase its allocation towards corporate social responsibilities especially on education.
3. Sugar factories management need to review the use of Sugarcane as collateral in provision of food crop inputs. They should prepare a budget and engage staff that can effectively plan, organize and implement the food security programme for sugarcane farmers. Farmers on the other hand should implement the information received on food security. Therefore both sugar factories management and sugarcane farmers need to realize the importance of both sugarcane and food security in their business and work in a win-win kind of business. Sugar factories management should also endeavor to search for partners in addressing farmers' food security by partnering with the Non-Governmental Organizations and Ministry of Agriculture and livestock.

4. County Governments need to facilitate the acquisition of equipment such as tractors for the farmers' cooperative societies in a bid to reduce exploitation by processors; Farmers ought to be facilitated to have shares in processing factories. County governments could buy shares on behalf of societies that can be paid off later from proceeds. This is of particular importance especially to sugarcane out-grower societies with the looming privatization of all state owned sugar factories.

5.6 Suggestions for Further Research

This study did not explore certain areas that were equally important. Such areas were left out because the scope of this study warranted. In view of this, the study suggests the following areas for further research:

- a) The influence of the rising cost of energy on sugarcane farming.
- b) Alternative modern farming methods that would integrate cane farming and food production to ensure food security.
- c) Factors that led to the collapse of out growers cooperative societies that championed the plights of farmers'.

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APPENDIX I

LETTER OF TRANSMITTAL

JACKSON PEMBERE WANYONYI

+254710739045

Dear Respondent

RE: FILLING OF THE QUESTIONNAIRE

I am a student of Master of Arts in Project Planning and Management at the University of Nairobi. I am currently doing research on influence of sugar factories on the improvement of sugarcane farmers' livelihood in Bungoma East Sub County. You have been identified as a potential respondent in this research. You have been nominated to participate in this study and your participation is purely voluntary. If you choose to participate, please provide accurate and honest answers as much as possible. As a measure of confidentiality, your name will not be required.

Thanks in advance for your support. The information you give will be treated as confidential. Kindly provide the information that is well known to you. Your support and co-operation is very important and will be highly appreciated.

Thank you.

Jackson PembereWanyonyi

Student -UON

L/50/76613/2014

APPENDIX II

QUESTIONNAIRE FOR THE FARMERS

PART A: PERSONAL DETAILS

[Please tick (✓) where appropriate]

1. Gender

i. Male () ii. Female ()

2. Age i. 18 – 20 () ii. 20 – 30 () iii. 30 – 40 () iv. 40 – 50 () v. 50 – 60 ()

vi. 60 – 70 ()

3. Education level

i. Primary () ii. Secondary () iii. College () iv. University () v. Post graduate ()

4. Marital status

Single () Married () Separated () Divorced () Widowed ()

Part B: INCOME

5. Please give the average income you earned from last cane harvested in Kshs/acre.

Less than 20,000 () 20,000-50,000 () 50,000-80,000 () 80,000-110,000 ()

Above 110,000 ()

TICK WHERE APPROPRIATE

6. Name some institutions sugar factories management are partnering with to address your financial requirements such as loans, school fees, medical treatment, food security etc. by using your sugarcane as collateral .

Institution

Financial requirement

_____	_____
_____	_____
_____	_____
_____	_____

7. How long did the sugarcane proceeds take to be paid after harvesting and delivery to the millers?

Days between delivery to millers and payment	Tick appropriately
Within 2 weeks	
Within 30 days	
Within 2 months	
After 2 months	

8. Has the proceeds from cane farming assisted you to improve the quality of life? (Tick where appropriate.

Yes.....
 No

9. Please indicate below how you spend income from sugarcane farming, indicating the most important priority as no. 5 and the least as no.1

Income expenditure	Priority
Pay fees	
Invest in business	
Buy family land	
Build family house	
Others	

10. What is the main source of income for your family; please rank below indicating no. 4 for the most important and no.1 for the least.

Source of income	
Sugarcane farming	
Employment	
Business	
Food crops	

11. Do you know about sugarcane pricing formula? a) yes----- b) No-----

PART C: EDUCATION

12. How many of your children attend school? _____ INDICATE

13. How many of your children don't attend school? _____ INDICATE

14. Do you have any child/ Children at risk of dropping school?

Yes () No () *TICK THE MOST APPROPRIATE ANSWER*

15. How many children that you live with have dropped out of school? _____
INDICATE

16. How would you rate the cost of affordability to school based on your average income?

VERY HIGH 1

HIGH 2

AVERAGE 3

LOW 4

VERY LOW

5

CIRCLE THE MOST APPROPRIATE ANSWER

17. What are the barriers that hinder your children to school enrollment?

18. What age are your children or children within the community likely to drop out of school because of fees problem?

- | | |
|--------------|---|
| 3-6 Years | 1 |
| 7-9 years | 2 |
| 10-13 years. | 3 |
| 14-18 years | 4 |
| 19-22 years | 5 |

CIRCLE THE MOST APPROPRIATE ANSWER

19. What happens to children who drop out of school because of fees problem?

20. Where do they go to after dropping out of school?

21. What portion of children who drop out of school re-enter back to school?

5%	1
----	---

10%	2
20%	3
30%	4
40%	5
Above 50%	1

22. Are all of your children in school/attended school? Tick the most appropriate.

Yes	1
No	2

23. What conditions hinder drop outs from re-enrolling?

24. What are the determinants of low and high rate of enrollment in schools?

25. Do the sugar factories assisted in any way in improving infrastructure development in schools? Tick the most appropriate

Yes	1
No	2

26. If YES, name some of the facilities provided/maintained with the companies' help:

27. Observe the classrooms, toilets and environment among others in schools in schools and rate. Tick the most appropriate answer.

	Very good	Good	Average	Poor	Very poor
Roofing					
Walling					
Floor					
Sanitation					
External environment					
Desks					

PART D: FOOD SECURITY

28. What is the estimated size of your land? _____ acres

29. How many acres of your land are under the following?

a) Sugarcane farming _____ acres

b) Food crops _____ acres

c) Fallow (pasture) _____ acres

d) Homestead _____ acres

30. Has the sugar factory management advised you to leave a third of your total land area for food crop production? Please tick the appropriate.

a) Yes _____ 1 b) No _____ 2

31. Tick below how management of sugarcane farming has affected food availability in your family over the years

- a) Positively (increased food availability) _____
- b) Negatively (reduced food availability) _____
- c) No change at all _____

32. In what ways has the sugar millers' management contributed towards achieving food security in your family, please rank 1-4. Rank 4 for most frequent and 1 for less frequent.

Ways on addressing food insecurity	Rank
Provide diary animals	
Provide maize/beans	
Education on food security	
None	

33. Rank below the source of food to your family. Rank 4 most frequent and 1 less frequent.

Source of food	Rank
Fully production from farm	
Buy from market	
Borrow from relatives/neighbors	
Sleep hungry/no meal	

PART E: INPUT BY THE SUGAR FACTORIES

34. Has cane farming contributed to improvement of road network? YES [] NO []

35. Has the access to information improved in relation to the operations of the sugar factories in your area?

Full access _____

Partial access _____

No access & satisfaction _____

TICK APPROPRIATELY

36. Which material is used to make your residence?

Mud _____

Cement _____

Mud + bricks _____

Tick appropriately

37. Where do you get your water?

Rain _____

Spring _____

Borehole _____

Tap _____

TICK APPROPRIATELY

38. Are there restrictions on the consumption of water? YES [] NO []

39. Do you own land besides your home garden? YES [] NO []

40..How many times has the extension staff visited your farm within the past one month, please indicate below. ----- Times

41. What activities did s/he advice you on, please tick below.

a) Planting of sugarcane

b) Fertilizer application

c) Weeding of sugarcane

c) Trash lining of sugarcane

d) Any other (specify) -----

42. How many extension meetings (barazas) have the farmers in your block held with extension staff within the past one month, please indicate ----- times. And what topics were discussed-----

43. Which method of extension services do you think is effective in helping improve sugarcane productivity, please tick below as many responses as you think are good?

- a) Farm visits by employees ()
- b) Extension meetings (barazas) ()
- c) Visit contact model (best) farmers ()
- d) Classroom training ()

44. Have you adopted/used new technologies released by, such as use of herbicides on weed control, varieties? A) yes----- b) No-----

If no, why are you not using, please indicate below.

45. What kind of relationship do you have with extension staff?

- a) Friendly () b) Casual ()
- c) Indifferent () c) Hostile ()

46. Has this relationship affected cane farming activities in your farm?

- a) Yes ()
- b) No ()

47. If yes, in which way has it affected your cane farming activities? -----

48. Who caters for transport of sugarcane to the factory after harvesting?

- I. Farmer
- II. The company
- III. Other

49. If the company, how are the deductions by the company?

- I. Very high
- II. High
- III. Medium
- IV. Low
- V. Very low

50. Does the company supply you with canes for planting?

- I. Yes
- II. No

If No, who supplies?

.....
.....

51. Who supplies you with fertilizer?

- I. Company
- II. Myself
- III. I Do not know

52. If by the company, how is the timeliness of the supply?

- a. Timely
- b. Untimely
- c. Do not know

53. Considering land prepared by the company and by yourself. Which one is best done?

- a. By the company
- b. By myself

54. Do the factories play any role in the conservation of the environment?

- a. Yes
- b. No

If yes which role do they play? -----

55. Do the sugar factories play any role in ensuring diversification through agroforestry?

- a. Yes
- b. No

RATING ON THE LEVEL OF SATISFACTION WITH THE SUGAR FACTORIES

56. How often do you take your cane to the sugar company?

Very Frequently _____ 1

Frequently _____ 2

Less frequently _____ 3

CIRCLE THE MOST APPROPRIATE ANSWER

57. Are the terms of transaction offered by the sugar companies favorable?

Yes _____ 1

No _____ 2

Thank You Very Much For Participating In This Study

APPENDIX III

DETERMINING SAMPLE SIZE FOR RESEARCH ACTIVITIES

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	140	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	381
210	136	1100	285	1000000	384

APPENDIX IV

WORK PLAN

ACTIVITY	JULY 2015	AUGUST 2015	SEPTEMBER 2015	OCTOBER 2015	NOVEMBER 2015	DECEMBER 2015	JANUARY 2016	March 2016
Identification of research Area								
Proposal Writing								
Proposal Defense and Corrections								
Data Collection								
Data Analysis and Thesis writing								
Submission of thesis defense and effecting suggestions								

Table below outlines the estimated time that the researcher took to complete the research



UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
DEPARTMENT OF EXTRA-MURAL STUDIES
KAKAMEGA & WESTERN KENYA AREA

Your Ref:
Our Ref: Uon/Cees/Kak/1/47/(25)
Kakamega 056-31038

P.O. Box 422
KAKAMEGA
Telephone

12th June, 2016

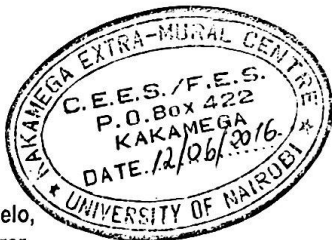
TO WHOM IT MAY CONCERN

REF: JACKSON PEMBERE WANYONYI - REG NO. L50/76613/2014

This is to confirm that the above named person is a student at the University of Nairobi, College of Education and External Studies, School of Continuing and Distance Education, Department Of Extra-Mural Studies, pursuing a course leading to the award of Masters of Arts in Project Planning and Management. He has completed the coursework and is now working on research work on the topic. **"Influence of sugar factories on the improvement of cane farmers livelihood in Kenya. A case of Bungoma East sub County performance of women entrepreneurs in Kenya: A case of Bungoma South"** Kindly accord him the necessary assistance to collect data for the above research. This is purely for academic purpose.

Any assistance accorded to him will be highly appreciated.

Yours faithfully,



for
Dr. Stephen Okelo,
Resident Lecturer,
Kakamega & Western Kenya Area.



Date: 05/07/2016

CREDIT ADVICE
CASH DEPOSIT

KCB WEDGE

Account AT KCB KIPANDE HOUSE

ACCOUNT DETAILS

A/C NO: 1108162847
A/C REF: 008241970264
KAT COMM FOR SCI ,TECH AND INH
Current Account-Corp Inst. Ban

We have credited your above account with

1,000.00 KES

Kenya Shillings ONE THOUSAND ONLY

CASH PAID IN BY: JACKSON DEMBERE WANYONYI
PERMIT APPLICATION

KCB BANK KENYA LTD.
WEPURU BRANCH
05 JUL 2016
TELE BR NO. 1783

Transaction Number: TT16187620QN

at 15:06:03

On 05/07/2016

Thank you for banking with us. You were served by: MALISHA LYNETTE

*** Advice not valid unless Transaction Number is shown ***