DETERMINANTS OF COTTON PRODUCTION AMONG SMALLHOLDER FARMERS IN KENYA: THE CASE OF MAKUENI COUNTY

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NOVEMBER, 2014
DECLARATION

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

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This project is dedicated to my wife Emmah Wanjiru, my children Elizabeth Mumbi and Ryan Kimani, and my brothers and Sisters. It is also dedicated to my beloved late parents.
ACKNOWLEDGEMENTS

I wish to acknowledge the support of those individuals who made it possible for a successful completion of this work. First I give regards to the almighty God for without you nothing would have been possible. Thanks to Dr. Patrick Mbataru, Dr Felix Kiruthu and Mr. Weldon Ngeno for continuous guidance throughout my project. My heartfelt appreciation goes to my family for moral and financial support, encouragement and goodwill, which saw the successful completion of this work. I appreciate the supportive encouragement accorded to me by my colleagues Morris Akiri, Dr Charles Agwanda, Professor Richard Musebe and Dr Daniel Karanja as I went through my studies.
ABSTRACT

This study was carried to determine cotton production among smallholder farmers in Makueni County. The study was based on the following objectives to: Identify the challenges experienced by smallholder cotton farmers in Makueni County; indicate the responses by the Government towards cotton production in Kenya and evaluate the role of policy and institutional incentives in the production of cotton. This study was conducted in the low rainfall cotton growing areas of Makueni, county in Kenya because it is among the major areas of cotton production in Kenya where the cotton yields both at county and at farm levels are well below potential. This study employed a descriptive survey design. The target population of the study was smallholder (< 1 ha) farmers who produce cotton under rain fed conditions and Extension Officers, CODA officers and KARI Officers with a sample frame of 3455 small scale farmers. Purposive sampling of target population in the cotton growing areas of Makueni County was sampled. In addition, a multistage random sampling was used to select sample of 103 cotton growers (respondents) and 12 various agricultural and cotton growing officials. Structured and semi-structured questionnaires and interview schedules were used to collect data from selected individual framers and interview guide. Pilot study was done on randomly cotton growing farmers within the county. This was mainly to verify whether the items generated by the researcher displays stimulus homogeneity hence valid and reliable. The instrument was evaluated for content validity that is the extent to which the questionnaire content, which includes vocabulary, sentence structure and the questions, are suitable for the intended respondents. The studies assessed reliability by split half method. In conclusion, because Kenya’s cotton sector is generally characterized by a large number of smallholder farmers with a low average yield and poor quality cotton fiber outputs making competition to be an issue particularly for small holder farmers not only in Makueni County but the entire country. The study mainly recommends that competitiveness of the cotton sub sector in Kenya should be addressed; at the moment the cost of production is high due to costs of electricity and use of outdated technology – these issues must be addressed in order to improve efficiency of production, lower costs and improve competitiveness. The state of infrastructure must also be addressed, as these are some of the concerns raised by the stakeholders to help small scale farmers. The study suggests that further studies on effects of cotton production among farmers should be carried in other parts of the country for comparison before generalization.
ABBREVIATIONS AND ACRONYMS

AAACP: All ACP Agricultural Commodities Programme
ACP: Africa Caribbean and Pacific
AGOA: African Growth and Opportunity Act
ASAL: Arid and Semi-Arid Lands
CABI: Centre for Agricultural Bioscience International
CFC: Common Fund for Commodities
CODA: Cotton development Authority
EPZA: Export Processing Zone Authority
EU: European Union
FFS: Farmer Field School
GOK: Government of Kenya
ICAC: International Cotton Advisory Committee
ICM: Integrated Crop Management
KARI: Kenya Agricultural Research Institute
KIPPRA: Kenya Institute for Public Policy Research and Analysis
LIST OF TABLES

Table 1: Cotton Production in bales from 2005 to 2010.................................................11
Table 2: Distribution of the respondents.................................................................20
Table 3: Composition of the focus group discussion participants ...............................20
Table 4: Multi-stage Sampling of Makueni County ..................................................21
Table 5: Cotton production trend in Makueni County (2005-2010)...............................29
Table 6: Crop enterprises among the sampled respondents........................................30
Table 7: Sources of Finance..........................................................................................34
Table 8: Factors affecting Cost of Production..............................................................35
Table 9: Cost of Cotton Production..............................................................................36
LIST OF FIGURES

Figure 1: Cost distribution for various activities in the production of one hectare of cotton (Source: Gitonga et al., 2011) ................................................................. 12
Figure 2: Conceptual framework .................................................................. 16
Figure 3: Gender Analysis ........................................................................... 26
Figure 4: Highest level of Education ............................................................ 27
### TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>ABBREVIATIONS AND ACRONYMS</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>ix</td>
</tr>
</tbody>
</table>

**CHAPTER ONE: INTRODUCTION**

1.1 Background to the Study ........................................... 1

1.2 Statement of the Problem ........................................... 4

1.3 Research Questions ................................................. 5

1.4 Objectives of the Study ........................................... 6

1.5 Research Premise .................................................. 6

1.6 Significance of the Study ......................................... 6

1.7 Scope of the Study ................................................ 7

1.8 Limitations of the study ......................................... 7

**CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

2.1 Introduction ..................................................... 8

2.2 Empirical Review ................................................ 8
CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction ........................................................................................................... 39

5.1 Summary of Findings ............................................................................................ 39

5.2.1 Effect of competition on cotton production ..................................................... 39

5.2.2 Marketing and Cotton Production ...................................................................... 40

5.2.3 Relationship between Cost of Production and cotton productivity ............... 40

5.2.4 Effect of capacity of farmers on cotton production ......................................... 41

5.3 Conclusion .............................................................................................................. 41

5.4 Recommendations .................................................................................................. 43

5.4 Suggestions for Further Research ........................................................................ 44

REFERENCES ............................................................................................................. 46

APPENDICES ............................................................................................................... 52

Appendix I: Questionnaire .......................................................................................... 52

Section A: Socio-economic Characteristics ................................................................. 52

Section B: Challenges facing Cotton production ....................................................... 53

Appendix II: Interview Guide ...................................................................................... 56
CHAPTER ONE: INTRODUCTION

1.1 Background to the Study
Cotton is an agro-industrial crop produced in both developing and developed countries as it accounts for more than half of all fiber used in clothing and household furnishings (Goreux, 2003). Cotton for long has significant place in the economic and political history of the world. For example, it played immense role since the industrial revolution of the 17th century. Currently, it is an important cash crop to a number of developing countries at farm and national level (Baffes, 2004).

The cotton industry and cotton related services play the foremost role in economy of many countries worldwide. In Pakistan for example, cotton industry contributes 63.9 percent of the total exports earnings (Government of Pakistan, 2007). It provides raw material to local/domestic cotton industry comprising of 503 textile mills, 1263 ginning factories, 8.1 million spindles and 2622 oil expelling units. It also yields 3.5 to 3.6 million ton of cotton seeds which contributes over 64 percent of the total domestic edible oil production (Pakistan Cotton Ginners Association, Textile Vision 2005). On global basis, Pakistan is the fourth largest cotton producing country of the world, after China, India and USA. Pakistan’s share of total world cotton production in 2004-05 stood at 9.47 percent (Cotton Statistical Bulletin 2006). It is the third largest yarn producer with 9 percent, second largest yarn exporter with 26 percent, third largest cloth producer with 7 percent and is also the third largest cloth exporter with 14 percent of the world cotton production (International Cotton Advisory Committee, 2005).

In Africa, Asia and Latin America, cotton is contributing a lot towards overcoming food insecurity. In Africa, thirty-five of the fifty-three countries produce cotton. Twenty-two of these countries are known for exporting it (Westlake, 2005). Ethiopia is one of the African countries that produce and export cotton. It has an estimated area of 2,575,810 hectares that is suitable for the cultivation of cotton (Demelash, 2006). In Ethiopia, spinning and weaving to make cloths from cotton is perhaps as old as the history of the country. Though written records are scarce, it is widely believed that
Ethiopians wore clothes woven from cotton fibers centuries ago. Still about 85% of the total population living in rural areas of the country, satisfies a significant part of its textile needs from the traditional non-industrial sector. Clothes that are woven from cotton are popular also in urban areas of the country (Mulat et al., 2004).

In Africa, cotton is typically produced by smallholders. More than two million rural households rely on cotton production to earn their living (Baffes, 2007). In some regions, it is the only cash crop and as such it represents the most important economic activity. Cotton sector’s share in the total merchandise exports of West and Central Africa (WCA) ranges from 25 to 45 percent, while its share in GDP ranges from 3 to 6 percent (World Bank, 2004). Although Africa’s overall share in world agricultural trade declined from 1980 to 2005, the share of cotton trade more than doubled over the same period (Tschirley, Poulton, and Labaste, 2009). This is due to a three-fold increase in cotton production from 1960 to 2001. These facts explain why the productivity and profitability of cotton production and processing are one of the key determinants of growth and of poverty across much of the continent.

Different studies have been conducted to ascertain the factors which are responsible for enhancing the production and ultimately benefiting the farmers. Carlos and Octario (2008) observed that high cost of inputs, scarcity of financial resources, lack of access to the markets and untrained farmers are responsible for the low yield per hectare and ultimately reduction in the benefits to the farmers. Anwar, (2008) calculated that the use of inputs has a direct bearing on the production and profit of the farmers. He found that cultivation cost, sowing cost, seed, fertilizer, pesticide, irrigation and labour are the important variables in production of cotton. Plant protection and irrigation are the most important variables which affect the cost of production.

Agriculture remains the backbone of the Kenyan Economy. It is the single most important sector in the economy contributing approximately 25% of the GDP and employing 75% of the national rural labor force, (Alila & Atieno, 2006). Over 80% of
the Kenya population live in the rural areas and derive their livelihoods directly or indirectly from agriculture. The importance of the sector in the economy is reflected in the relationship between its performance and that of the key indicators like GDP and employment. Trends in the growth rates for agriculture, GDP and employment shows that the declining trend experienced in the sector’s growth is reflected in the declines in employment and GDP as a whole (Alila & Atieno, 2006).

Since independence, Kenya’s cotton-textile-apparel industry has gone through major phases. At independence private ginners dominated the industry. Over the following ten years the Government helped cooperative societies to buy the private ginners from the colonialists and instituted a regime of controlled margins and fixed farm-gate cotton prices. In addition, it invested in a number of textile mills, which supplied the largely private apparel (or garment) manufacturers. Under this regime (which was also characterized by large donor support), land under cotton expanded by 180% and processing capacity by 60% in the 1970s. However, Government and donor assistance started declining in the mid-1980s, which saw lint production drop by 57% between 1984/85 and 1992/93 (Omollo, 2006). By the time the Government begun to liberalize the industry in 1991 it was in tatters; cotton production had almost ground to a halt, many ginners had either collapsed or had excess capacity, and many textile firms had collapsed. These were accelerated by liberalization, whose serious implementation started in 1993 and the export ban slapped on Kenyan textile products in the USA market in 1994. These factors saw lint production drop to an annual average of 20,000 bales, where it still remains, despite the country’s large potential estimated at 300,000 bales (Government of Kenya, 2000).

In Kenya, cotton is considered under the Kenya Vision 2030 and the government’s Medium Term Plan 2008-2013 as one of the most important industries to implement the long term Arid and Semi-Arid Lands (ASAL) development initiatives and industrialization strategy. It is among the few cash crops that thrive well in the fragile ASAL regions, where few other economic opportunities exist, and hence a major potential source of employment, income generation and food security (GoK, 2003). The area under cotton production is estimated at 40,000 ha against a potential of
385,000 ha (CODA annual report 2009). Until Government initiatives to encourage cotton growing began to take effect in 2006, national production stood at only 5,000 tonnes from 30,000 ha in 2005 (Alila & Atieno, 2006).

Within the last 20 years, there has been a significant shift in the national, regional and international policy environment in relation to the Kenyan cotton productivity. Some of the policies have resulted in positive, negative or have had no impact or effect (ACTIF, 2013). The import substitution policies put in operation soon after independence, between 1963 and 1986, coincided with the period during which the textile industry performed well (Institute of Economic Affairs, 2009). Under the Kenya Government’s policy for addressing poverty ‘Kenya Vision 2030’, cotton has been identified as a key sub-sector with the potential to benefit 8 million people in the drier areas of the country. The Cotton Development Authority (CODA) has been set-up to coordinate rehabilitation of the cotton sector (Gitonga et al, 2007).

During that time there was a robust and integrated cotton-textile sector with extensive institutional support mechanisms, public sector participation and elaborate subsidy programmes (KIPPRA, 2013). The key challenges on poor cotton productivity revolves around high input costs including labour and energy, transport, out dated technology, expensive credit, low investment and poor product quality and unpredictability of prices and lack of market outlets. This has resulted in the influx of second hand products displacing the Kenyan industry. Based on the above background, it can be seen that smallholder farmers may be affected, as they are producers and consumers of goods. This study will therefore identify the determinants of cotton production among small holder farmers. Thus government need to put proper policies that support these farmers, to ensure their overall welfare is not compromised.

1.2 Statement of the Problem
Decline in agricultural production has been a major problem facing the Kenyan economy since Independence (KIPPRA, 2013). Given the importance of agriculture and particularly the cotton sub sector in Kenya on rural livelihoods and general well being of the macro-economy, there is need to identify the determinants of production in the sector for policy advice. Different studies have been conducted to ascertain the determinants which are responsible for enhancing the production and ultimately benefiting the farmers. Khan et al. (1986) and Hassan (1991) observed that high cost of inputs, scarcity of financial resources, lack of access to the markets and untrained farmers are responsible for the low yield per hectare and ultimately reduction in the benefits to the farmers. Nabi (1991) calculated that the use of inputs has a direct bearing on the production and profit of the farmers. He found that cultivation cost, sowing cost, seed, fertilizer, pesticide, irrigation and labour are the important variables in production of cotton. Plant protection and irrigation are the most important variables which affect the cost of production. Cotton is one of the most important sources of income for many smallholder farmers in Kenya.

Studies by Ikiara & Ndirangu (2002) and Wakhungu & Wafula (2004), suggested that Kenyan cotton is chronically uncompetitive with examples of negative gross margins. Another study on cotton production and marketing constraints carried out in 2005 by KARI-Mwea, however, indicated that profit margins ranged from KES 1,614 to 12,520 per hectare, at buying prices of KES 20-25. Given that the average yield is only 572 kg/hectare profitability would be greatly improved even with production at 50% of the yield potential of the commercial varieties. Many rural farmers in Kenya grow cotton as a cash crop, which has the potential to provide them with a route out of poverty. There are also policy issues which impact on the already complex situation, such as price-setting for seed cotton, subsidies for inputs and access to input credit. This research therefore evaluated the factors affecting cotton productivity among smallholder farmers in Makueni county of Kenya.

1.3 Research Questions

The study was based on the following research questions
1. Do competitions in the sub-sector affect cotton production by small holder farmers in Makueni County?

ii. To what extent do marketing affects cotton production among small holder farmers in Makueni County?

iii. What is the relationship between cost of production and cotton productivity among small holder farmers in Makueni County?

iv. How is cotton production affected by capacity of farmers in Makueni County?

1.4 Objectives of the Study

The study was based on the following objectives to:

i. Find out how competition in the sub-sector affects cotton production by small holder farmers in Makueni County

ii. Establish the extent to which marketing affects cotton production among small holder farmers in Makueni County

iii. Examine the relationship between cost of production and cotton productivity among small holder farmers in Makueni County

iv. Determine how cotton production is affected by capacity of farmers in Makueni County.

1.5 Research Premise

For the purpose of this study, the following assumptions were made.

i. There is competition in the sub-sector affecting cotton production by small holder farmers

ii. Marketing affects cotton production among small holder farmers.

iii. There is a relationship between cost of production and cotton productivity among small holder farmers

iv. Cotton production is affected by capacity of farmers

1.6 Significance of the Study

This study will generate useful information aimed at improving cotton production and productivity in the selected counties and suggest measures for increasing adoption of integrated crop management practices that will serve as a guide to policy prescriptions
aimed at revamping the cotton industry. Knowing and understanding the key variables, which affect production of farmers, is of great importance for designing economic policies and the ultimate implementation of vision 2030 in Kenya. Identifying the reasons for differences in cotton production in Kenya is not only important from a historical perspective, but also useful to evaluate the effects of existing and new policies.

There are critical problems facing smallholder cotton producers in poor rural areas of the country and there is need to assess the causes of success and failure of policy interventions to support such farmers. Empirical studies in these areas are rare and they have not been sufficiently recognized and articulated by researchers. There is therefore need to conduct a study exploring these issues. A deeper understanding of various policy instruments which enhance production is crucial for economic policy making in Kenya.

1.7 Scope of the Study
This study was conducted in the low rainfall cotton growing areas of Makueni, county in Kenya because it is among the major areas of cotton production in Kenya where the cotton yields both at county and at farm levels are well below potential.

1.8 Limitations of the study
The study would have covered all the cotton growing areas of Kenya but cotton growing areas are sparsely distributed. The selected counties have suitable agro-ecological zone for cotton growing. In the selected counties farmers are sparsely populated making it difficult to interview all cotton growers. However, farmers who are members of cotton Farmer Field School (FFS) and who meet regularly at the cotton FFS study plots were interviewed using questionnaire and focus group discussion.
CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction
This section reviews theoretical and empirical literature on the key study variables with the aim of identifying research gaps. It examines literature on the concept of cotton production and the specific areas covered here are theoretical review.

2.2 Empirical Review

2.2.1 Cotton Context
Even though cotton no longer stands among Kenya’s leading cash crops, such as tea, horticulture, sugar cane and coffee, it was once an important source of income for rural communities in areas with low agricultural potential, as well as an important source of raw material for a thriving national textile industry. Despite the sector’s decline in recent years, cotton is still considered one of the few cash crops with real potential for increasing employment opportunities and food security through income generation in the Arid and Semi-Arid Lands (ASALs) of Kenya (CODA, 2008). Thus, revitalizing the cotton sector is one of the government’s key development and industrialization initiatives to be implemented mainly in the ASAL regions, but also on other high potential areas for this crop, under Kenya’s Vision 2030 strategic plan and its Medium Term Plan, 2008-2012 (GOK, 2008).

2.2.2 Overview of Cotton production
Globally, over 70 countries produce and export cotton, while many developed and developing countries depend on imports of cotton lint for their spinning and textile industries. Eight countries, China; USA; India; Pakistan; Uzbekistan; Turkey; Brazil; and Australia are responsible for 81% of global output, with leading African producers that include Cameroon, Côte d’Ivoire, Chad, Benin, Togo and BukinaFaso accounting for approximately 20% of the output (Badiane et al., 2002). The main producers in Eastern Africa include Tanzania, Uganda, Kenya and Sudan.

In Kenya, cotton was introduced in 1901 by the British colonial administration and promoted as a suitable cash crop in areas where other crops did not fare well (Waindi
and Njonge, 2005). It is one of the few cash crops suitable for marginal, low rainfall areas, which cover about 87% of the country’s landmass, and are home to about 27% of the population (Ikiara and Ndirangu, 2002). According to the “Developing a revival strategy for Kenya’s Cotton textile industry report (GoK, 2003) the crop is grown in Nyanza, Western, Coast, Central, Eastern and Rift Valley provinces, largely under rain fed conditions. Irrigated cotton is produced mainly in Hola and Bura (Tana River District) and parts of Kerio valley. About 350,000 hectares in the country are suitable for cotton production and have the potential to yield an estimated 260,000 bales of lint annually. However, cotton is only being cultivated on about 40,000 hectares at present, with an annual lint production of 20,000 bales while the National demand is 140,000-250,000 annually (Bartok, 2009).

2.3 Challenges on Cotton Production

According to the World Bank (2005) and the CODA (2008), the following are some of the key challenges responsible for the cotton sector’s poor performance.

2.3.1 Unavailability of Quality Seeds

The lack of certified seed has contributed to low production of the cotton crop (Obare, 2009). A seed bulking and certified support programme was started in 2007. However, this is currently inadequate and requires strengthening in terms of additional trained manpower and financing. Investments especially on equipment for the commercial production of seed by the private sector is also limited.

2.3.2 Cotton Prices

According to the Cotton Development Authority (2008), there are both international and national price for seed cotton. The international price is influenced by the forces of supply and demand in the international market whereas the national price is determined by the stakeholders at the beginning of each cropping season. In 2010, the floor (minimum) price set was Ksh 32 per kg at the buying centers. The world price of cotton between August 2000 and September 2001 was about US $ 1/kg of lint, equivalent to about KES 26/kg of seed cotton, assuming a ginning outrun ratio of
approximately 33%. This price has since been on the decline, and has been declining in real terms since 1950. Between 1950 and 1988 for instance, the price of lint fell by 60% in real terms from US$ 1.60/lbs in 1950 to 0.65/1b in 1998.

Besides the competition from man-made fibres, the major cause of decline in world cotton prices is the increase in international supply due to subsidies maintained by the leading cotton producers mainly the USA, China and the EU (Kooistra, et al., 2006). The challenge facing many cotton producers in Kenya is how to retain competitiveness in the face of this long-term world decline, through cost rationalization, higher production and yield enhancement strategies in the cotton sub-sectors and other stakeholders. The pricing structure at every stage of the supply chain should not penalize some parties at the expense of others. There must be transparency in the pricing structures especially in spinning and weaving.

According to a report by the Institute of Economic Affairs (2009), continued synthetic competition, diminishing world prices, introduction of cheap imports of second hand clothes and diminished cotton profitability were amongst factors that dealt a blow both to cotton production, and the textile and clothing industries. However, the production is slowly picking up after years of neglect and disillusionment among farmers. The revival of the Salawa Cotton Ginnery in Baringo district has played a great role in revitalizing farming activities in the Kerio Valley region (Harnevik & Bryceson, 2008). Gitonga et al. (2007) presented a five cotton production trend between 2005 and 2010 (Table 2.1).
Table 1: Cotton Production in bales from 2005 to 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Production in Bales</th>
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<tbody>
<tr>
<td>2005</td>
<td>20,000</td>
</tr>
<tr>
<td>2006</td>
<td>50,000</td>
</tr>
<tr>
<td>2007</td>
<td>45,035</td>
</tr>
<tr>
<td>2008</td>
<td>27,194</td>
</tr>
<tr>
<td>2009</td>
<td>26,821</td>
</tr>
<tr>
<td>2010</td>
<td>58,000</td>
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Source: (Gitonga et al, 2007)

Other challenges that led to this decline included failure of the country’s cotton growing sector to provide enough raw materials to the textile mills, increasing use of synthetic fibres, and a worsening of the operating environment manifested by high cost of inputs and electricity and poor infrastructure. The closure of the textile and garment industries had the following effects: Massive loss of employment estimated at over 70,000 jobs, loss of government revenue due to closures, loss of investor confidence. Other issues include that most of the workers who lost their jobs in the textile industries have joined the informal activities such as trade in small enterprises, some of which are engaged in sale of imported clothes and second-hand clothing and shoes and in some towns like Eldoret, Thika and Kisumu where there was a concentration of textile activities, there has been shrinkage of the local economy, with other business activities equally impacted negatively (EPZA, 2005).
2.3.3 High cost of inputs
Costs associated with spraying, weeding and harvesting contribute to the high cost of production. Pesticide costs are high and can contribute up to 51.70% of the input costs (Figure 1). Gross margins can range from KES 1,614 to KES 12,520 per hectare. Besides, inadequate use of mechanization, contributes significantly to high production costs (Gitonga et al., 2007).

![Percentage cost KES/ha)](image)

**Figure 1**: Cost distribution for various activities in the production of one hectare of cotton (Source: Gitonga et al., 2011).

2.3.4 Cotton Marketing
On average, cotton farmers are making a loss of KES 3 per Kg of seed cotton produced, largely because of the high cost of production in an environment characterized by the global decline in lint prices (Ikaria & Ndirangu, 2002). World lint prices fell in real terms by more than 60% between 1950 and 2000. Major cost drivers are cost of pesticides, lack of extension services and poor infrastructure. Cost associated with pesticides constitutes about 29% of the total production cost (Kooistra, et al., 2006).

Market failure is manifested by the absence of fair competition among ginners in some parts of the country and excessive competition (predatory practices) that renders important mechanism like input credit supply schemes unfeasible in other parts.
Studies by Ikiara and Ndirangu (2002) and Wakhungu and Wafula (2004), suggested that Kenyan cotton is chronically uncompetitive with examples of negative gross margins. Another study on cotton production and marketing constraints carried out in 2005 by KARI-Mwea, however, indicated that profit margins ranged from KES 1,614 to 12,520 per hectare, at buying prices of KES 20-25. Given that the average yield is only 572 kg/hectare, profitability would be greatly improved even with production at 50% of the yield potential of the commercial varieties.

2.4 Government Response towards Cotton Production in Kenya

Under the Kenya Government’s policy for addressing poverty ‘Kenya Vision 2030’, cotton has been identified as a key sub-sector with the potential to benefit 8 million people in the drier areas of the country. The Cotton Development Authority (CODA) has been set-up to coordinate rehabilitation of the cotton sector.

The Cotton amendment Bill of 2006 provided the legal framework for Government supported re-organization of the cotton sector. Already there has been some impact with national production rising to 9,800 tonnes in 2006 from 5,090 tonnes in 2005. However, this increase was mainly due to an increase in the number of producers (hectares under cultivation) rather than any substantial increase in productivity. Average yields remain at 400 – 600 kg/ha of seed cotton.

Available data show that the number of gazetted Export Processing Zones (EPZ) in the country has increased gradually from 10 in 1993 to 41 in 2004 (Republic of Kenya 2005; 1995). The number of operating enterprises within the zones has also grown from 12 in 1993 to 74 in 2004, representing an average annual increase of 47% (Kibua & Nzioki, 2004). Local investor participation, especially in the EPZs, has been significant. About 11% of the total EPZ firms are wholly Kenyan, while joint ventures are 74%. According to the Export Processing Zones Authority (EPZA), the total investment in the textiles sub-sector as at December 2003 was Ksh. 9.7 billion (US $132.9 million). Most of the large investors are in the EPZs while a few are under the MUB scheme.
2.5 Role of Policy and Institutional Incentives on Cotton Production

Developing and expanding Kenya’s cotton sector is a key agricultural strategy outlined in the national Vision 2030 plan, capable of benefiting more than 8 million people living in the country’s Arid and Semi-Arid Lands (CODA, 2008). In an effort to revitalize the country’s cotton sector, the Kenyan Ministry of Agriculture (MoA) passed the Cotton (Amendment) Bill in 2005, which provided the legal framework to re-organize the sector, allowing stakeholders to regulate the industry through the Cotton Development Authority, under the supervision of the MoA (CGD Bills Digest, 2005). Although seed cotton production grew in the two years after the Bill was adopted, this growth was largely due to a small increase in the number of producers, rather than an increase in productivity (Gitonga et al., 2007).

A major policy change affecting the cotton sector in recent years was the promulgation of the 2006 Cotton (Amendment) Act, which created the Cotton Development Authority (CODA), with the mandate of promoting and regulating the cotton industry (Kenya Gazette Supplement, 2006). The CODA was established to replace the Cotton Board of Kenya, moving regulation authority from the government to industry stakeholders, including cotton growers, ginners and manufacturers (CGD, 2005).

There are policy issues which impact on the already complex situation, such as price-setting for seed cotton, subsidies for inputs and access to input credit. Cotton farmers are very price sensitive but attempts to control the price can have a negative impact on the willingness of the private sector to invest in production support mechanism. During the 2010 budget speech, the then Finance Minister Hon. Uhuru Kenyatta doubled duty on imported second hand clothes in a move that was largely seen as lifeline for the struggling industry. The taxman increased the charges to Sh2.1 million, up from Sh1.3 million per container (Githae, 2012/2013) leading to increased prices on second hand clothes.

The local cotton and textile industry danced at this development but the recent move by the Finance Minister to reduce import duty on second hand clothes from 2 million
shilling to a million per container dashed their hopes. This has seen widespread sale of second hand clothes in the country. The cotton industry lacks manpower development policy, a dynamic technology, development policy, a regulatory and legal framework consistent with the current liberalized environment, a comprehensive policy. There is also a glaring absence of strategic positioning policy. Thus, even as global dynamics of the cotton-lint-textile-apparel chain governance change, there is no strategic response in the country, with the result that the country's producers continue suffering worsening terms of trade (The Moi University 10 year strategic plan 2005 – 2015).

Key among policy failures in the entire cotton-lint-textile-apparel industry is the abrupt way that liberalization was carried out. The sector was opened up completely and suddenly, without offering players sometime for adjustments. The cotton Board of Kenya was left without any role in the industry and yet no alternative institution was set up to carry out crucial regulatory and coordination tasks. Besides this failure, the industry lacks manpower development policy, a dynamic technology development policy, a regulatory and legal framework consistent with the current liberalized environment, a comprehensive policy framework covering all links in and aspects of cotton-lint-textile-apparel value chain and comprehensive institutional strategy (Regional Agricultural Trade Expansion Support program, 2003).
2.5 Conceptual Framework

**Figure 2:** Conceptual framework

<table>
<thead>
<tr>
<th><strong>Independent variables</strong></th>
<th><strong>Dependent variable</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macro-Economic Policy</strong></td>
<td>Increased output</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>Harvested crop yield per hectare</td>
</tr>
<tr>
<td>- Price policy</td>
<td>Value of crop produced per household</td>
</tr>
<tr>
<td>- Policy and institutional factors</td>
<td></td>
</tr>
<tr>
<td><strong>Marketing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Competition and Cost of Production</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other Factors</strong></td>
<td></td>
</tr>
<tr>
<td>- Research and Extension Facilities</td>
<td></td>
</tr>
<tr>
<td>- Status of productivity</td>
<td></td>
</tr>
</tbody>
</table>

Source: Researcher (2014)

Mugenda and Mugenda (2003), define a conceptual framework as a hypothesized model identifying the concepts under study and their relationships. In this framework, there are certain factors that cotton production practices. These factors include but are not limited to education, age, Gender, total land owned, land under cotton, farm labour, and cost of inputs, cotton prices, pests and diseases. For this study, 5 variables are considered as the independent variables. Cotton productivity among smallholder farmers is the dependent variable that is affected by the independent variables as illustrated in figure 2.

2.6 Theoretical framework

Utility maximization approaches encompass the dual character of peasant households as both families and enterprises and thereby take account of the consumption side of the peasant. The seminal work by Chayanov in the 1960s emphasized the influence of
family size and structure on peasant economic behaviour, through the subjective
evaluation of labour within the household, in the absence of the labour market
(Chayanov, 1966).

In expanding the scope of the Chayanovian model and assuming perfect market, the
neoclassic farm household model became popular in the 1960s to explain the
behaviour of farm households in simultaneous decision making about consumption
and production. This model typically incorporates the notion of full household income
(Becker, 1965) and conceives of the household as a production unit that converts
purchased goods and services as well as its own resources into use values or utilities
when consumed. Thus the household maximizes utility through the consumption of all
available commodities, subject to full income constraints.

The model shows that if all markets exist and all goods are trade able, prices are
exogenous and production decisions are taken independently of consumption
decision. In such condition, the decision making process could be regarded as
recursive because time spent on leisure and time used in production becomes
independent; utilization of family labor will be directly linked to the market-
determined wage rate and income is singled out as the only link between production
and consumption. In the absence of labour market as in Chayanovian model, or any
missing market the decision may not be recursive because the family will be left to
decide about the percentage of its total available time to be devoted to production.
Therefore there is no reparability between consumption and production (ACTIF,
2013).

Hence the validity of recursive modelling of household resource allocation depends
on the household being a price taker and the absence of missing imperfect markets. In
reality households operating in developing countries are likely to face more than one
market imperfection which prevents first-best transactions and investments from
taking place. Empirical analysis of recursively in farm household decision making
have generally produced negative results (ACTIF, 2013).
Hence theoretical advances on farm household models with missing market have opened to a new research agenda for neoclassical economists; the households' objectives agenda is still to maximize utility from a list of consumption goods, but subject to what may be a large set of constraints in which a missing market is yet another constraint on the household. At the same time the task of empirical economies has shifted to providing evidence of market efficiencies and their impact on household production choice. Criticisms if these theoretical frameworks are particularly severe when uncertainty and risk aversion are acknowledged (ACTIF, 2013).
CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction
This chapter outlines the methodological approach that was used in carrying out the study. It covers the research design, study area, target population, sampling procedure and sample size, instruments, validity of the instrument, reliability of the instrument, procedure for data collection, data analysis and findings.

3.1 Research Design
This study employed a descriptive survey design. According to Saunders, Lewis and Thornhill (2003) survey strategy is a deductive approach popular in business research. The main advantage of this research design is the ability to collect large amounts of data from sizeable population in a highly economical way.

3.2 Location of the study
This study was conducted in Makueni County of Kenya. Makueni County is located in the Southern end of Eastern Province and covers an area of 7,965.8 km². The County has been subdivided into eight (8) Sub Counties, namely Makueni, Kathonzweni, Kilungu, Mbooni East and West, Kibwezi, Nzau and Mukaa. These areas have been selected because of convenience and accessibility for the study. This area was selected because of being very suitable for cotton production in addition to cotton being the main crop enterprise. It is also agro-ecological zones suitable for cotton production.

3.3 Target population
A target population is a group of individuals or a group of organization with some common definitive characteristics, (Creswell, 2005). Data was collected from smallholder (< 1 ha) farmers who produce cotton under rain fed conditions and Extension Officers, CODA officers County Administrators and KARI Officers with a sample frame of 3455 small scale farmers.
3.5 Sample and Sampling Techniques

3.5.1 Sampling Technique

Multistage random sampling was used to select a sample of 103 cotton growers (respondents) and 12 various agricultural and cotton growing officials. Multistage sampling refers to sampling plans where the sampling is carried out in stages using smaller and smaller sampling units at each stage. This study will employ a three-stage sampling starting from the county down to the sub-counties and then at the wards.

The sample size for the questionnaire administration is represented in Table 3.1 and the composition for the Focus group is represented in Table 3.2 and Multistage sampling in Table 3.3.

Table 2: Distribution of the respondents

<table>
<thead>
<tr>
<th>Population</th>
<th>SAMPLE FRAME</th>
<th>SAMPLE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>3,455</td>
<td>91</td>
</tr>
<tr>
<td>Other Officials</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>106</strong></td>
</tr>
</tbody>
</table>

Source: Researcher (2014)

Table 3: Composition of the focus group discussion participants

<table>
<thead>
<tr>
<th>Member Category</th>
<th>Makueni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer Representative</td>
<td>5</td>
</tr>
<tr>
<td>MoA Extension Officer</td>
<td>3</td>
</tr>
<tr>
<td>CODA Officer</td>
<td>2</td>
</tr>
<tr>
<td>County Administrators</td>
<td>3</td>
</tr>
<tr>
<td>KARI Officers</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Source: Researcher (2014)
Table 4: Multi-stage Sampling of Makueni County

<table>
<thead>
<tr>
<th>Sub-County</th>
<th>Wards</th>
<th>Frequency of Frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makueni</td>
<td>Kalamba,</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Mavindini</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Kathonzweni</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Kitise</td>
<td>10</td>
</tr>
<tr>
<td>Mbooni West</td>
<td>Mbuvo</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Kanzokea</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Kithuki</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Kavingoni</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>91</td>
</tr>
</tbody>
</table>

Source: Researcher (2014)

3.5 Research Instruments

Structured and semi-structured questionnaires and interview schedules were used to collect data from selected respondents. The questionnaires were used to collect data from individual farmers while interviews were used to collect data from other officials. A questionnaire is preferred because questionnaires consist of many items combined and more reliable measure of constructs than would any single item. It offers considerable advantages in administration: it presents an even stimulus potentially to large numbers of people simultaneously and provides investigation with an easy accumulation of data. Questionnaires give respondents freedom to express their views or opinion and make suggestions while interviews provided in-depth information mostly qualitative that may not be captured by the questionnaires. On the other hand, interviews were conducted to investigate issues in an in-depth way, interviews also helps to discover how individuals think and feel about a topic and why they hold certain opinions and deepen understanding and explain statistical data where questionnaires cannot capture.
3.6 Pilot study

Pilot study was done on randomly cotton growing farmers within the county. This was mainly to verify whether the instruments generated by the researcher displays stimulus homogeneity hence valid and reliable. Piloting was also done with the purpose of detecting any weakness and finding out if the questionnaires are clear to the respondents. The researcher administered research instrument to a few randomly selected cotton producers who may not be selected for the actual study. The results of the pilot study were analyzed and used to modify and remove ambiguous items on the instruments used in the study.

3.6.1 Validity

Validity refers to the extent to which an instrument measures what is supposed to measure. The instrument was evaluated for content validity that is the extent to which the questionnaire content, which includes vocabulary, sentence structure and the questions, are suitable for the intended respondents. Content validity is done by expert judgment. The study used validated instrument to adequately address the objectives of the study. The researcher sought the expertise of the supervisors to check if the instruments were viable to collect the intended data.

3.6.2 Reliability

The study assessed reliability by split half method. This method is more practical in that it does require two administrations of the same or an alternative form test. In the split- halves method, the total number of items was divided into halves and a correlation taken between the two halves. This correlation only estimates the reliability of each half of the test. The score from each half will then be compared by assigning each test item score on a scale from 0.1 to 1.0. Next, a calculation of correlation between the two ratings was done to determine the level of reliability. The Cronbach Alpha coefficient of all values 0.7 and above was accepted.
3.7 Data Collection Techniques

The researcher personally visited the selected respondents in the sample to establish rapport for commencement of data collection exercise. The data was collected by distributing the questionnaires to the respondents and then collected the filled questionnaires at a later date for data analysis. The researcher also used interview schedules to get information from sampled key informants. In doing this the researcher first made a courtesy call to the identified farmer representatives, MoA Extension officers, CODA officers, KARI Officers, County Governor and Member of County assemblies to book an appointment and agreed on a specific date and time for the interview. Others included County Commissioner and County Administrators. When booking the appointments, the researcher introduced him/herself, explain to each of the respondents reason for the study.

3.8 Data analysis

Both quantitative and qualitative data were analyzed. During quantitative data analysis, overall data quality was assessed and all the variables chronologically arranged with respect to the questionnaire outline. This ensured that the correct code is entered for the correct variable. The data, in form of the coded variables, was then entered into the Statistical Package for Social Sciences, followed by data editing. This exercise ensured that every data entered for each questionnaire in each variable is correct. Analyzed data were then presented using tables, graphs and pie charts for clarity easy interpretation. For qualitative data, a checklist was developed which was the principle guide in data analysis. The checklist was clustered along main themes of the research to ease consolidation of information and interpretation based on research objectives. The checklist made it possible to put together scattered information under a particular theme which in turn greatly aided in interpreting information.
3.9 Ethical Consideration

Ethical considerations were pertinent to this study because of the nature of the problem, the methods of data collection and the kind of persons serving as research participants. While carrying out this study, participants were informed of the nature of the study and allowed to choose whether to participate or not. The researcher therefore ensured that participants know that their involvement is voluntary at all times. To safeguard the privacy of the participants, respondents were kept in a private environment away from passers-by or intruders. Asking participants not to write their names on the questionnaires during the research also helped in ensuring anonymity.
CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION

4.0 Introduction

Content in chapter four is data analysis, presentation and interpretation of the study findings. The subtitles in this chapter are arranged according to the objectives of this study. The survey was carried in Makueni County particularly in eight (8) Sub Counties, namely Makueni, Kathonzweni, Kilungu, Mbooni East and West, Kibwezi, Nzaui and Mukaa Sub counties. This study involved randomly selecting the farmers who were known to have been growing cotton prior to the study and those who had a cotton crop in the field during the study period. To ensure fair representation, the enumerators were trained on how to cover all the locations with cotton production activities while allowing for at least a kilometer between the sampled farm(s). This survey was supplemented by focus group discussion.

The study findings have been presented in frequency distribution tables, percentages and explanations of the findings in between the frequency tables for further elaboration as well the interpretation of the study results have been given alongside the findings. All the 91 issued questionnaires from small holder cotton farmers were receive and focus group results from 15 representatives of Extension Officers, CODA officers, Farmer representatives, County Administrators and KARI Officers. Thus, the questionnaire return rate was 100 per cent, which the researcher used as an excellent response rate of the study participants. This was possible because the study applied guided questionnaires approach to collect the data.

4.1 Socio-economic Characteristics

To establish the socio-economic characteristics of the respondents particularly the farmers, they were asked to state their gender, ages, highest formal education attained and the main occupation of the household head.
4.1.1 Gender
The household heads were asked in the questionnaires to state their gender and Figure 4.1 presents the finding.

Figure 3: Gender Analysis

![Graph showing gender distribution.]

Source: Researcher (2014)

As shown in Figure 4.1, above over three quarter of the household heads 86.4% were male while 13.8% were female headed household. The researchers had the assumption that gender of household head was an important variable to interrogate as farmers from male-headed households are more likely to participate in cotton production than members from female headed household. This gender differentiation results forms biases in access to various forms of capital against female-headed households. This assumption was however confirmed by the respondents that in Kathonzweni Sub County, female headed households are poor and one of the vulnerable groups relative to male-headed households.

4.1.2 Ages of the Respondents
The farmers were asked to state their ages and the minimum, the maximum and the mean age of the household head was 20, 77 and 93 and 50 years, respectively. The study established that younger cotton farmers tend to have a higher degree of
commercialization compared to older farmers. This suggests that although large household size positively affects participation in cotton production and commercial markets, it can negatively affect the extent of commercialization particularly due to household age differences. Older household heads are more likely to have larger household sizes, which despite their labour availability advantage, increases the cotton production.

4.1.3 Level of Education

When the respondents were asked about their highest academic qualifications, results indicated that the majority 54.0% had primary education as shown in Figure 4.2.

Figure 4: Highest level of Education

An analysis of the education level of the respondents indicated among those who had formal education 54.0% and 30.0% had primary and secondary school level of education, respectively while 16.0% had post-secondary level of education. It is generally recognized that education equips individuals with the necessary knowledge of how to make living (Gerald, 2008). Thus, for the purpose of this study, the researcher believes that those who are literate and have at least some education are better able to make the transition to cash crops. This is so because it is believed that
producers with higher levels of education tend to have greater access to cotton production and market information, hence expected to produce market-oriented cash crops which agrees with the argument by (Mbataru, 2010).

4.1.4 Occupation
In terms of occupation of the household head, most of those who were interviewed were farmers (76%) with the remaining 24% being engaged in a combination of farming and other kinds of businesses including Government employees, business, and teachers.

4.1.4 Type of Housing Structure
The area of the study was characterized by three types of housing structure including permanent (24%), semi-permanent (50%) and traditional (26%). The type of housing from tradition toward the permanent housing structures is perceived to indicate improved livelihood and higher stands of living.

4.1.5 Size of Land Owned
The minimum, the maximum and the mean acreage per households was 1, 80 and 10.5 acres, respectively. Among the respondents, there was no land rented in or out. This is a continuous variable representing the size of land allocated to cotton production in specified year by producer farmers and is measured by hectare. The study expected that, as cultivated land size increases, provided other associated production factors remain constant, the likelihood that the farmers produce more cotton was high.

4.1.6 Size of the Family
In the questionnaires, the respondents were asked to indicate the size of their families. The study revealed that there was a minimum of 2 (per family) and maximum of 15 people in a family however there was an average of 5 persons per family. This is a continuous variable referring to farmer’s access to family labour. In this study, the researchers considered active family labour as who can participate in agricultural activity in the household. Thus, this variable was expected to positively affect the
probability decision to produce cotton and the amount to be produced. This is because cotton is a labour intensive crop, thus requires high labour and in these rural areas there is no market for labour or if any imperfect. Thus, family labour was the main source of labour force in cotton production in the entire Makueni County.

4.2 Effect of competition on cotton production

According to Karanja et al (2012), cotton production and yields are relatively low in Makueni County; the amount of cotton lint marketed is often insufficient to fulfil national demand. Therefore, many local spinners and textile mills rely on processed cotton imports to meet their demand. The first objective of this study was therefore to find out how competition in the sub-sector affects cotton production by small holder farmers in Makueni County.

In a bid to establish the effect of competition on production of cotton by small scale farmers, the study analyzed production performance in this sector for a period 2005 to 2010 and Table 4.1 presents the findings.

Table 5: Cotton production trend in Makueni County (2005-2010)

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target ha</td>
<td>2000</td>
<td>2000</td>
<td>1000</td>
<td>3000</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td>Achieved ha</td>
<td>300</td>
<td>400</td>
<td>400</td>
<td>500</td>
<td>667</td>
<td>-</td>
</tr>
<tr>
<td>Target yield per ha</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Achieved yield per ha</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>1.7</td>
<td>-</td>
</tr>
<tr>
<td>Target yield total</td>
<td>4000</td>
<td>4000</td>
<td>2000</td>
<td>6000</td>
<td>2000</td>
<td>-</td>
</tr>
<tr>
<td>Achieved yield total</td>
<td>120</td>
<td>200</td>
<td>240</td>
<td>350</td>
<td>1134</td>
<td>-</td>
</tr>
<tr>
<td>Average yield kg/ha</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>200</td>
<td>600</td>
<td>-</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>232/ha</td>
</tr>
</tbody>
</table>

Table 4.1 shows that Area planted and production of cotton averaged 2000 hectares and between 120 to 1134 metric Kilograms achieved yield respectively. Production
fluctuated from a low of 120 metric Kilograms in 2005 to a high of 1134 metric Kilograms in 2009. The figures recorded in 2009 can be a result of the Land Reform policy which dismantled the Large Scale farming community. Productivity averaged 232 Kilograms per hectare with the lowest yield of 100 Kilograms per hectare recorded in 2005 and a high of 600 Kilograms per hectare in 2009. The high productivity can be attributed to development of irrigation infrastructure. Summary of growth rates and trends in production during the 2005-2010 periods of cotton grew at an average rate of 17.06 per cent and this may be explained by the government policy. The government during this period heavily supported small scale farmers who formed the majority of the farming community.

Since the 1970s large scale farmers contributed more to cotton production than smallholder farmers but production in the sector declined in the 1980s as found in (Karanja et al 2012). This study concurs with findings during interviews with representatives of Extension Officers, CODA officers, Farmer representatives, County Administrators and KALRO Officers that the decline in the number of large-scale commercial cotton growers is due to competitions and an increasing number of farmers diversifying into more lucrative export crops such as Green grams, maize, cowpeas and beans due to reduced viability in the cotton sector.

To confirm the existence of competition with other crops the farmers were asked to state other crops that were preferred to cotton. They were also asked to state area (acre)/% growing, annual yields (kg), prices per kg/ha and annual income as compared to cotton production. Table 4.2 presents the findings.
### Table 6: Crop enterprises among the sampled respondents

<table>
<thead>
<tr>
<th>Type of crop</th>
<th>Area (acre)%growing</th>
<th>Annual yields (kg)</th>
<th>Prices per kg/ha</th>
<th>Annual income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Ave</td>
<td>Min</td>
</tr>
<tr>
<td>Green grams</td>
<td>0.2</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Maize</td>
<td>0.2</td>
<td>5</td>
<td>10</td>
<td>2.6</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>0.2</td>
<td>5</td>
<td>3</td>
<td>0.8</td>
</tr>
<tr>
<td>Sorghum</td>
<td>0.2</td>
<td>5</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Pigeon peas</td>
<td>0.2</td>
<td>5</td>
<td>1.2</td>
<td>20</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.2</td>
<td>5</td>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td>Beans</td>
<td>0.2</td>
<td>5</td>
<td>1</td>
<td>0.6</td>
</tr>
</tbody>
</table>

- **No response**

As shown in Table 4.2 above there is decline in cotton production as compared to other crops like green grams and maize in terms of annual yields due market completion however cotton remains the highest annual income earner.

This study finding acknowledges the fact that even though cotton no longer stands among Kenya’s leading cash crops, such as tea, horticulture, sugar cane and coffee, it was once an important source of income for rural communities in areas with low agricultural potential, as well as an important source of raw material for a thriving national textile industry not only in Makueni County but the entire Country. Despite
low average yield (about .53 tonnes of seed cotton per hectare between 2000 and 2010) and poor quality cotton fiber outputs (FAOSTAT, 2012). Approximately 384,500 hectares of irrigated and rain-fed land is available for cotton production, of which only about 10 percent is currently harvested (World Bank, 2005; CODA, 2008). Given the average yield, the national production potential for available land is around 200,000 tonnes of seed cotton. However, the average production of 18,000 tonnes per year over the period 2005-2010 represents a mere 9 percent of this potential.

4.3 Marketing and Cotton Production
Cotton production and yields are relatively low in Kenya; the amount of cotton lint marketed is often insufficient to fulfil national demand. The respondents were therefore asked to indicate where they marketed their cotton, to whom and at what time.

The survey data indicates that majority (97.44%) of cotton producer reported that they supplied their produce to the market. Sampled farmers were also asked to identify their usual way of selling their produce. About 90.22% of them reported that they sell directly to traders or purchasers at local or primary markets. Only about 9.78% of cotton producers said they sold their produce through brokers. Similarly these sampled farmers reported that the usual time they sell their produce was one month after harvest, (about 33% of farmers reported). In addition, 65 percent of them replied that they sold their cotton immediately after harvest. Only 2% of cotton farmers said they stored their produce for two months after harvest. The reason they present is that cotton easily be contaminated and its seeds affected if it is stored at home longer. Thus, they prefer to sell immediately after harvest without expecting high price in the future.

Market and price liberalization of the cotton sector in 1991, as well as the lack of stakeholder organizations and institutional support has led to the cotton sector’s decline since early 1990s in the County. It was not until 2006 that a mechanism to set reference prices was established. Currently, cotton general regulation requires CODA
to arrange a cotton stakeholder meeting to discuss and agree on a floor price for the season.

The study (90.0%) established that international cotton prices, FOB adjustments and transport costs, floor prices for both seed cotton and ex-ginnery lint are set each year and was in agreement with (CODA, 2010). Since 2005, CODA had established more than 250 authorized buying points throughout Kenya’s cotton production areas in an effort to reduce access costs and facilitate exchange between farmers, agents and ginners. Despite all these reforms in cotton there were still challenges in marketing of cotton in the entire Makueni County.

According to Ikiara and Ndirangu (2003), liberalization of the cotton industry in 1991 allowed cotton growers for the first time to negotiate prices directly with buyers. Though this was first seen as an advantage to farmers, the lack of supportive market and governmental institutions, coupled with stiff competition in an unregulated market, led to a general decline in the prices received by producers (CGAE, 2006).

This study established that no secondary market for seed cotton exists; ginneries are the only market and, therefore, in theory, have significant power to dictate prices paid to local producers. The study was further informed that cotton growers have made some attempts to organize as a way of increasing their market power, but have had little success due middle men and brokers. On the other hand, ginneries are also extremely dependent on local seed cotton supply, so the market relationship is one based on interdependence that has not been fully actualized not only in Makueni County but the entire Country.

4.4 Relationship between Cost of Production and cotton productivity

To obtain the relationship between cost of production and cotton productivity, the respondents were asked to state where they obtained funds for cotton production and Table 4.3 presents the findings
### Table 7: Sources of Finance

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frq. In %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks/ credit</td>
<td>67.0</td>
</tr>
<tr>
<td>Ginner</td>
<td>2.0</td>
</tr>
<tr>
<td>Other farm enterprises</td>
<td>10.0</td>
</tr>
<tr>
<td>Business</td>
<td>18.0</td>
</tr>
<tr>
<td>Salary/wage</td>
<td>55.0</td>
</tr>
<tr>
<td>Remittance</td>
<td>21.0</td>
</tr>
<tr>
<td>Others</td>
<td>15.0</td>
</tr>
</tbody>
</table>

As shown in Table 4.3 above majority 67.0% received their funding from banks and credit from other institutions, 55.0% received funding from their own salaries and wages and 18.0% from their businesses. According to Karanja et al (2012), cost of cotton production affects many decisions, from applying inputs to marketing. It is important to be able to know production costs for specific farming operation against the productivity in order to compare with other areas and do some benchmarking. In conclusion the study failed to establish the clear relationship between cost of production and productivity due to lack of compromise the data on cost of production. For instance, there were certain inherent limitations, like seed cotton yield could not be estimated in both Makueni County and the inputs were found to be subsidized in different areas making it difficult to calculate the actual cost of production.

The study investigated factors affecting cost of cotton production and Table 4.4 presents the findings.
Table 8: Factors affecting Cost of Production

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frq. In %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease and pest related</td>
<td>70.5%</td>
</tr>
<tr>
<td>Inputs &amp; Equipment related issue</td>
<td>56.7%</td>
</tr>
<tr>
<td>Market related issues</td>
<td>73.0%</td>
</tr>
<tr>
<td>Transportation</td>
<td>40.0%</td>
</tr>
<tr>
<td>Delayed payment</td>
<td>89.0%</td>
</tr>
<tr>
<td>Low prices</td>
<td>65.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 shows that 89.0% of the farmers were affected by delayed payment. As a result, they could not engage in farm activities in time, could not buy farm inputs in time hence increased cost of production due price fluctuation of inputs. Market related issues affected 73.0% of the farmers. This included lack of direct market which forced them to use brokers and middle who greatly exploited cotton farmers particularly in Kathonzweni in Makueni County. Other issues included cost of equipment related issues 56.7% and low prices 65.4%.

The study endeavoured to investigate the role of various inputs, the cost benefit ratio for the farmers and cotton productivity. They were asked to indicate the cost of all input per acres of land in cotton production per year and Table 4.3 presents the findings.
Table 9: Cost of Cotton Production

<table>
<thead>
<tr>
<th>Operation</th>
<th>Area (acre)/%growing</th>
<th>Annual yields (kg)</th>
<th>Cost per kg/ha in KSh</th>
<th>Annual income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min x Ma Av growing g</td>
<td>min max Av</td>
<td>Min Max Ave</td>
<td>Min Max Av</td>
</tr>
<tr>
<td>Cultivation</td>
<td>0.25 3 1 78</td>
<td>10 720 48 9</td>
<td>200 700 5200</td>
<td>400 2340 99</td>
</tr>
<tr>
<td>Sowing</td>
<td>0.25 10 2.6 92</td>
<td>8 225 77 5</td>
<td>500 2600 1500</td>
<td>750 4500 9</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>0.25 3 0.8</td>
<td>30 450 38 4</td>
<td>100 500 2000</td>
<td>800 9000 70</td>
</tr>
<tr>
<td>Plant Protection</td>
<td>0.25 1 0.7 16</td>
<td>50 540 20 1</td>
<td>- - -</td>
<td>400 1200 23</td>
</tr>
<tr>
<td>Labour</td>
<td>0.25 5 1.2 70</td>
<td>20 900 28 9</td>
<td>500 6000 2500</td>
<td>360 2430 59</td>
</tr>
<tr>
<td>Total Cost /acres</td>
<td>0.25 10 2 100</td>
<td>80 150 41 2</td>
<td>400 2060 1220</td>
<td>104 9600 13</td>
</tr>
</tbody>
</table>

The results show that in all operations, cost of production was a minimum of 4000 KShs and a maximum of 20,600 and an average of 12,200 per acre annually against an annual average income of 13037 Ksh. The net per acre return for was an average of 412 Kgs of cotton lint and a maximum of 1500 Kgs per acre. The study further analyzed the production cost of each item against productivity of cotton.

4.4.1 Cultivation Cost

Table 4.3 shows that cost for the variable of cultivation is averagely 5200 KSh per acre showing with a yield of an average of 489 Kgs. It shows that yield value per acre varied. Therefore to increase productivity of cotton, the cultivation cost must equally
decrease. Cultivation cost was found to be highly significant and indicating a strong impact on cotton yield.

4.4.2 Seed/Sowing Cost
The importance of seed in the cotton production was widely accepted in this study. The data results for the in Makueni County given in Table 4.3 depicts that cotton production on per acre basis can be increased significantly by increasing the expenditure on seed. The average cost of sowing was 1500 KSh with a yield of 775 Kgs per acre. The expenditure on seed means use of good quality seed and improved methods of sowing which had a strong positive relationship with productivity of cotton.

4.4.3 Fertilizer
This was an important component of productivity as it was found to being used by the cultivators prior to germination and for the vegetative growth of cotton plant. Farmers used fertilizer after the germination of cotton. In Makueni County, the cost of this variable was estimated at an average of 2000Ksh, indicating that cotton yield in this county was responding to the increases in the use of fertilizer.

4.4.4 Plant Protection
Cotton crop is very sensitive to pests and diseases Gitonga et al (2007). In order to control the attack of pests and diseases farmers were using heavy pesticides. So the role of this factor was important in the cotton production. Like others factors, this study failed to establish the actual cost of plant protection as almost all respondents were non-committal on the actual cost.

4.5 Effect of capacity of farmers on cotton production
Cotton production depends on the capacity of farmers, especially for small farmers in Makueni County. The study established that if cotton does not remain a financially viable crop for farmers due to low yields as a result of soil depletion, dropping water tables and a lack of technical know-how particularly lack of capacity, the farmers will switch to other cash crops. This could result in market volatility and swings in supply.
Hence, switching from conventional methods to better cotton ensures that cultivation stays profitable in the long term.

Through interviews, the study established that better cotton production helps the farmer to bring a competitively priced product to market that satisfies the consumers. Therefore cotton farmers should have the capacity to actualize the same. Capacity building has a positive effect on productivity in that an increase in more sustainable farming practices leads to significant improvements in mainstream cotton production and to less environmental and social harm for cotton farmers. Reducing the use of water, expensive pesticides and fertilizers not only reduces the expenditures and frees up household income, but also leads to health benefits for farmers and their families.
CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction
This chapter comprises of and is organized into the following subheadings: summary of findings, conclusions of the study, recommendations of the study and suggestions for further studies based on the study objectives. The study was based on the following objectives: find out how competition in the sub-sector affects cotton production by small holder farmers; establish the extent to which marketing affects cotton production among small holder farmers; examine the relationship between cost of production and cotton productivity among small holder farmers and determine how cotton production is affected by capacity of farmers in Makueni County.

5.1 Summary of Findings

5.2.1 Effect of competition on cotton production
This chapter analyzed effect of cotton production performance in Makueni County. It started by looking at aggregate production and found out that cotton production and yields are relatively low in the two counties; the amount of cotton lint marketed is often insufficient to fulfil national demand. Following that the chapter characterized effect of competition on production of cotton by small scale farmers. Results show production performance in this sector for a period 2005 to 2010 and in Table 4.1. The Table shows that production fluctuated from a low of 120 metric Kilograms in 2005 to a high of 1134 metric Kilograms in 2009. The figures recorded in 2009 can be a result of the Land Reform policy which dismantled the Large Scale farming community. Productivity averaged 232 Kilograms per hectare with the lowest yield of 100 Kilograms per hectare recorded in 2005 and a high of 600 Kilograms per hectare in 2009. Therefore it can be concluded that more than half of cotton output is produced by smallholder farmers. The chapter then finally looked at the possible determinants of cotton production in Makueni and possible explanations of effects of competition where found to be price of cotton and of other competing crops.
5.2.2 Marketing and Cotton Production

In terms of the extent to which marketing affects cotton production among smallholder farmers in Makueni County, the survey data indicates that majority (97.44%) of cotton producers reported that they supplied their produce to the market. Sampled farmers were also asked to identify their usual way of selling their produce. About 90.22% of them reported that they sell directly to traders or purchasers at local or primary markets. Only about 9.78% of cotton producers said they sold their produce through brokers. Similarly, these sampled farmers reported that the usual time they sell their produce was one month after harvest, (about 33% of farmers reported). In addition, 65 percent of them replied that they sold their cotton immediately after harvest. Only 2% of cotton farmers said they stored their produce for two months after harvest. The reason they present is that cotton easily be contaminated and its seeds affected if it is stored at home longer. Thus, they prefer to sell immediately after harvest without expecting high price in the future.

5.2.3 Relationship between Cost of Production and cotton productivity

In summary concerning relationship between cost of production and cotton productivity, some important variables were considered to determine their effects on cotton productivity. All the variables were found positively contributing towards higher yield of cotton in study area. From the discussion, it was concluded that there was a dire need to fulfil the scarcity of resources for enhancing cotton production. Among them, the major inputs include availability of quality seed, fertilizers like DAP and Urea. The farmer’s income from his cotton harvest in Makueni County was often lower than the cost of the inputs due to low crop yields and market prices, driving more and more farmers into debt. As cotton is a cash crop, cotton farmers are highly dependent on volatile Kenyan markets. Cost of cotton production affects many decisions, from applying inputs to marketing. It is important to be able to know production costs for specific farming operation against the productivity in order to compare with other areas and do some benchmarking. In conclusion the study failed to establish the clear relationship between cost of production and productivity due to lack of compromise the data on cost of production. For instance, there were certain
inherent limitations, like seed cotton yield could not be estimated in both Makueni County and the inputs were found to be subsidized in different areas making it difficult to calculate the actual cost of production.

5.2.4 Effect of capacity of farmers on cotton production

To determine how cotton production is affected by the capacity of the farmers, majority 67.0% received their funding from banks and credit from other institutions, 55.0% received funding from their own salaries and wages and 18.0% from their businesses to enhance their capacity to produce cotton. The study established that better Cotton production helps the farmer to bring a competitively priced product to market that satisfies the consumers. Therefore cotton farmers should have the capacity do actualize the same. Capacity building has a positive effect on productivity in that an increase in more sustainable farming practices leads to significant improvements in mainstream cotton production and to less environmental and social harm for cotton farmers.

5.3 Conclusion

For objective one, competition has seriously affected cotton productivity, therefore this study concurs with findings during interviews with representatives of Extension Officers, CODA officers, Farmer representatives, County Administrators and KALRO Officers that the decline in the number of large-scale commercial cotton growers is due to competitions and an increasing number of farmers diversifying into more lucrative export crops such as Green grams, maize, cowpeas and beans due to reduced viability in the cotton sector. The negative effect of competition in the sub-sector on cotton production by small holder farmers in Makueni County in not an exception because Kenya’s cotton sector is generally characterized by a large number of smallholder farmers with a low average yield and poor quality cotton fiber outputs making competition to be an issue particularly for small holder farmers not only in Makueni County but the entire country.

For objective two, the study concludes that there is a need to find further mechanisms of mitigating challenges of cotton and its effect on cotton production. This is because
there have been reforms and despite all these reforms in cotton there were still challenges in marketing of cotton in the entire Makueni County. Since 2005, CODA had established more than 250 authorized buying points throughout Kenya’s cotton production areas in an effort to reduce access costs and facilitate exchange between farmers, agents and ginners. Even though cotton growers negotiated prices directly with buyers, lack of supportive market coupled with stiff competition in an unregulated market, led to a general decline in the prices received by producers. Due to lack of secondary market for seed cotton, ginners are the only market and therefore in theory, they have significant power to dictate prices paid to local producers. The study was further informed that cotton growers have made some attempts to organize as a way of increasing their market power, but have had little success due middle men and brokers. On the other hand, ginners are also extremely dependent on local seed cotton supply, so the market relationship is one based on interdependence that has not been fully actualized not only in Makueni County but the entire Country.

Objective three regarding the relationship between cost of production and productivity, the study concludes that there is a need to fulfil the scarcity of resources for enhancing cotton production. Among them, the major inputs include availability of quality seed and fertilizers. There are many factors that affect the production of cotton. In this study, some important variables were considered to determine their effects on cotton productivity. All the variables were found positively contributing towards higher yield of cotton in study area. The study revealed that the yield and profitability increases as the size of holding increases. The large farmers in the study area were found more technology as well as resource oriented. The cost of production for farmers is higher resulting in low yield and low profit. The study reveals that farmers, who are already resource deficient, cannot bear the burden of increasing cost of inputs. To address this issue, provision of subsidized inputs for this category of farmers is the need of the hour which will help not only to enhance cotton productivity, profitability and improve the living standards of farmers.
On objective four, improving capacity of the farmers is key to the better cotton production, however, the production process is incomplete if the better produced cotton does not enter the supply chain or if it cannot be traced through the various stages of processing and manufacture into the finished product. That means it is necessary to create a series of linkages between the actors in the chain – from farmers to ginners and from ginners to suppliers. Based on the study findings, policy failure is also a key issue characterizing the Cotton-textiles sub-sector; the way in which liberalization was carried out completely and suddenly without prior consultation with stakeholders, there were no complimentary polices for the stakeholders to cope with effects of liberalization and no time allowed for adjustment. With the abolishment of cooperative societies an privatization of state owned corporations, the Cotton Board of Kenya was left without any role in the industry and no alternative institutions were set up to deal with issues of regulation and coordination in the industry.

5.4 Recommendations

Based on study findings, the study made the following recommendations:

In response to objective one, competitiveness of the cotton sub sector in Kenya should be addressed; at the moment the cost of production is high due to costs of electricity and use of outdated technology – these issues must be addressed in order to improve efficiency of production, lower costs and improve competitiveness. The state of infrastructure must also be addressed, as these are some of the concerns raised by the stakeholders. Taxes and ad-hoc charges, which raise costs of production, must also be lowered to improve the enabling environment for the sub sector.

For objective two, lack or inadequate availability of quality seeds of cotton locally is an obstacle to improve yields and income for rural livelihood in the project target area and cotton production zones in general which has far reaching impact on the marketing of cotton. Therefore provision of quality seeds and seed multiplication initiative needs to be expanded to cater for the high demand for cotton seed not only in Makueni but entire Country.
Concerning objective three, the cost of production for small farmers is higher resulting in low yield and low profit. The study reveals that the small farmers, who are already resource deficient, cannot bear the burden of increasing cost of inputs. To address this issue, provision of subsidized inputs for this category of farmers is the need of the hour which will help not only to enhance cotton productivity, profitability and improve the living standards of the small farmers.

In objective four Improving capacity of the farmers is key to the better cotton production but if the better produced cotton does not enter the supply chain or not traced through the various stages of processing and manufacture into the finished product that sells to customers; it is necessary to create a series of linkages between the actors in the chain – from farmers to ginners and from ginners to suppliers.

Finally innovative strategies are required to encourage more participation of women particularly where cotton production is largely perceived (culturally) to be exclusively for men with women being engaged in production of food crops. With the high incidences of migration of men to the cities (urban centres mainly Nairobi) among others, women (and youth) are now taking over as the head of households

5.4 Suggestions for Further Research

Based on the study findings, the researcher suggested that further studies on effects of cotton production among farmers should be carried in other parts of the country for comparison before generalization. This study examined determinants of cotton production among smallholder farmers, but did not quantify the welfare effects of government policies on cotton producing households. There is also need to study the relationship between farmers’ responsiveness to policies and welfare affects in future studies.
REFERENCES


APPENDICES

Appendix 1: Questionnaire

Section A: Socio-economic Characteristics

1. Age of respondent

2. Gender: Male [ ] Female [ ]

3. Highest formal education attained by the respondent (circle answer): non-formal Education [ ] primary [ ] secondary [ ] post-secondary [ ]
   Other (specify) [ ]

4. Main occupation of the household head/respondent (circle answer):
   Farmer [ ] Business [ ] Teacher [ ] Government Employee [ ]
   NGO employee [ ] other (specify) [ ]

5. Type of Housing Structure
   Permanent [ ] Semi-permanent [ ] Traditional Hut [ ]

5. Size of Land

5. Family Size

7. In the table shown below please list and rank in order of importance 5 major crop enterprises that you had planted last time you grew cotton (year....................)

<table>
<thead>
<tr>
<th>Crop Enterprise</th>
<th>Area (Acre)</th>
<th>Annual yield</th>
<th>Price per kg/unit</th>
<th>Annual income</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section B: Challenges facing Cotton production

Where do you obtain funds for cotton production?

Banks/credit [ ] ginner [ ] Other farm enterprises [ ] Business

Salary/wage [ ] Remittance [ ] Others (name)---------------------

5. What are the challenges that affect the production of cotton in your area?

Disease and pest related { }
Inputs & Equipment related issue { }
Market related issues { }
Transportation { }
Delayed payment { }
Low prices { }
Others...........................................................

In your opinion what are the facing cotton production in this area?

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

Section C: Intervention Measures

6. What do you think should be done to improve cotton yield per ACRE?

_________________________________________________________________________
9. Please list any development programme/activity being carried out in your area to tackle the cotton production constraints

i. 

ii. 

iii. 

iv. 

10. Where do you get advice on better cotton farming practices?

Government extension officer=1, neighbours=2, NGOs=3, private companies=4, none=5, others (specify) =

11. Please suggest your perceived methods for improving interactions/relations between you and other cotton stakeholders as indicated below.

I. Extension officers:
ii Researchers

iii Other cotton farmers

iv. Cotton buyers

v. Cotton ginneries

vi. Cotton Development Authority
Appendix II: Interview Guide

Evaluating factors affecting cotton production in selected counties in Kenya

Focus group discussion checklist for farmers, extension officers & other actors

1. What are the major income generating activities of farmers

2. Generate a list of major cotton production constraints by consensus and provide a matrix scoring for the constraints.

3. What is the rate accessibility to improved cotton production inputs, and mechanisms for improving accessibility?

4. What tools and equipment are bottlenecks in cotton production?

5. State the support required for cotton marketing with respect to transportation, storage issues, price/ payment (promptness, amounts), governance in smallholder farmer organizations, emerging issues

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Required support</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment promptness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment amount</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. What are the policy and regulatory issues touching on: production, post-harvest handling, marketing, environment and labour regulations
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke

When replying please quote

Ref: No.

Date:

27th November, 2014

NACOSTI/P/14/2827/4339

Martin Githuku Kimani
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "Determinants of cotton production among smallholder farmers in Kenya: The case of Makueni County," I am pleased to inform you that you have been authorized to undertake research in Makueni County for a period ending 31st December, 2014.

You are advised to report to the County Commissioner and the County Director of Education, Makueni County before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

Said Hussein
FOR: SECRETARY/CEO

Copy to:

The County Commissioner
Makueni County.

The County Director of Education
Makueni County.

THIS IS TO CERTIFY THAT
MR. MARTIN GITHUKU KIMANI
of KENYATTA UNIVERSITY, 633-621
nairobi, has been permitted to conduct
research in Makueni County.

on the topics: DETERMINANTS OF
COTTON PRODUCTION AMONG
SMALLHOLDER FARMERS IN KENYA: THE
CASE OF MAKUENI COUNTY.

For the period ending
31st December, 2014.

Signature:

National Commission for Science,
Technology & Innovation

Republic of Kenya

Kenyatta University Library