INFLUENCE OF SOCIO-ECONOMIC FACTORS ON SUSTAINABLE PRODUCTION OF COTTON IN KISUMU COUNTY, KENYA

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M.A, B.A (MASENO UNIVERSITY)

A THESIS SUBMITTED TO THE BOARD OF POSTGRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN DEVELOPMENT STUDIES, DEPARTMENT OF SOCIOLOGY AND DEVELOPMENT STUDIES, KISII UNIVERSITY

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This thesis, a product of my original work, has not been presented for a PhD in any other university, showcasing its unique contribution to the field.

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DEDICATION

This work is dedicated to my children. I appreciate your concern. Special thanks to Salma for the constant push and Marsha and Don Phillip for standing with me despite hard times. Lastly, to a very unforgettable lady: my late mum, Phoebe, known by many as “Mama Rossy.” Mama, I will never stop loving and missing you. Thank you for being my mother.

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ABSTRACT

Sustaining cotton production is a challenge facing Kisumu County and the Kenyan government. Cotton is an important crop whose production affects the livelihoods and development of the county. Several interventions have been done in the sector since independence to sustain cotton production in areas with competitive advantages, like Kisumu County, for the related industries to operate at total capacity, with little success. This led to the closure of the industries, negatively affecting livelihoods and development. The sustainable production of locally produced cotton is yet to be realized. This informed the study. The main objective of this study was to investigate the influence of social and economic factors and to evaluate the interventions in place for sustainable cotton production and development in Kisumu County. Specific objectives were to assess the influence of social factors, Gender, Cultural beliefs, Religion, economic factors, Marketing, and Distance from buying centers, and the interventions affecting sustainable cotton production in Kisumu County. The dependent variable was sustainable cotton production, while social and economic factors and the interventions in place formed the independent variables. The study was guided by systems theory by Ludwig Von Bertalanffy,1901-1927. A mixed research design combining inferential and descriptive data was employed and analyzed quantitatively and qualitatively. Data collection included field surveys, interviews with stakeholders, focus group discussions, and the utilization of existing datasets. The target population was 660 cotton farmers, obtained through purposive sampling. The representative sample was 240 cotton farmers, calculated using Israel's (1992) formula. Other respondents linked to cotton production were 53 through stratified random sampling, giving 293 respondents. The study administered 293 questionnaires and received 267, while 26 were not returned. Semi-structured interview schedules with questionnaires were used to collect quantitative data, which was analyzed using descriptive and inferential statistics. In contrast, Focus Group Discussions, Key Informant Interviews, and observation were used to collect qualitative data, which was analyzed by categorizing relevant responses to answer research questions. Research instruments were validated before fieldwork, and reliability was determined through the test-retest technique. Findings revealed that many social and economic factors influence sustainable cotton production and development in Kisumu County. Knowledge from research findings will contribute to overcoming constraints to sustainable cotton production, assist policy and decision-makers in government and non-governmental institutions, and improve the existing cotton literature in Kisumu County. The study concluded that there is a need for the government, private sector, and stakeholders to increase extension services to farmers, lobby for policies that would address social and economic factors surrounding cotton production, reduce or stop the importation of related competing products and improve cotton prices in the local market. The study recommends that adequate extension services be provided to farmers and relevant policies be adopted to assist all the stakeholders in the cotton value chain to sustain cotton production.

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LIST OF ABBREVIATIONS AND ACRONYMS

AFFA Agriculture Food and Fisheries Authority

AGOA African Growth Opportunities Act

ASAL Arid & Semi-Arid Land

ASDS Agricultural Support & Development Services

ATC The Agreement on Textiles and Clothing

CBO Community-Based Organization

CODA Cotton Development Authority

COMESA Common Market for Eastern & Southern Africa

EAC East Africa Community

EPZ Export Processing Zone

EU European Union

FAO Food and Agriculture Organization of the United Nations

GATT General Agreement on Tariffs and Trade

GDP Gross Domestic Product

GM Gene Modified

GMO Grain Modified Organisms

GoK Government of Kenya

ICAC International Cotton Advisory Committee

IFCP International Forum for Cotton Promotion

IFPRI International Food Policy Research Institute

KALRO Kenya Agriculture and Livestock Research Organization

KARI Kenya Agricultural Research Institute

KEBS Kenya Bureau of Standards

LTA Long-Term Agreement on International Trade in Cotton Textiles

MFA Multi-Fibre Arrangement

NEF National Empowerment Fund

NGO Governmental Organization

STA Short-Term Agreement on International Trade in Cotton Textiles

SCAOs Sub-County Agricultural Officers

ACTIF – African Cotton and Textile Industry Freedom

ASDSP- Agriculture Sector Development Support Programme

AGOA - African Growth Opportunity Act

ASAL- Arid and semi-arid areas

EPZ- Export Processing Zone

EPZA- Export Processing Zone Authority

GDP- Gross Domestic Product

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Agriculture is an important component of rural income and development worldwide. This sector is essential for rural economies and assists in developing regions where agricultural practices are feasible and sustainable. Sustainable cotton cultivation can result in permanent employment, enhanced livelihoods, and diminished poverty. Accessibility to, control of, and the handling of resources are factors that impact agriculture and determine the kinds of activities that are carried out and the products that are generated. Agriculture includes both food and cash crops, with cotton cultivation being a significant global commercial commodity. The Gossypium genus classifies cotton, a plant that developed hairy seeds and later underwent domestication. The cotton-producing species possess seeds covered in small hairs and a secondary covering of long, spin-able fibers known as lint. Ginning, a mechanical procedure that separates the fibers from the cottonseed, easily removes the loosely linked hairs on the cottonseed (Strelis & Kennedy, 2019). Cotton is the preeminent fiber crop globally, mainly cultivated for its lint, accounting for 90% of total fiber production and serving as the cornerstone of most textile enterprises worldwide (Liu et al., 2015). The by-products possess numerous industrial applications—fibers utilized in the textile sector, serving as the foundation of the production chain. The leading cotton-producing nations are China, India, and the United States, responsible for 70% of global

cotton output. Crops are vital for rural livelihoods and development in numerous countries, including India, Pakistan, and other African nations. Approximately 45 million, 10 million, and 7 million rural households in China, India, and Pakistan, respectively, engage in cotton cultivation. From the 18th to the 20th century, cotton was the predominant crop in the area known as "The Cotton Belt." The region has reduced its cotton acreage due to soil depletion and socio-economic developments, and now primarily cultivates crops like corn, soybeans, and wheat. Cotton is the predominant natural fiber in worldwide commerce, representing approximately 32% of the entire fiber market, while wool constitutes slightly under 4%. In the past three decades, natural fibers have diminished in market share relative to synthetic fibers. From 2005 to 2009, cotton's proportion of global fiber production decreased from 35.7% to 31.7%. Although cotton's market share in the global fiber industry is declining, its consumption is rising overall due to population expansion. Developing nations produce over two-thirds of cotton. Numerous Central American nations that once generated about 250,000 tons of fiber now produce virtually none. From 1960 to 2000, cotton demand increased in parallel with population growth. In contrast, the consumption of chemical fibers has steadily risen over the past four decades, resulting in a decrease in cotton's proportion of overall fiber consumption from 60% to below 40% by 2000. International trade engages one-third of cotton production (M. Shahbandeh, 2020).

The scale of the leading producers' textile businesses largely determines cotton consumption. China, the preeminent textile producer, accounted for over one-quarter of the global output throughout the late 1990s. Together with China, these countries represent three-quarters of the world's cotton consumption. Multiple East Asian nations have recently

become significant consumers of cotton. As an example, countries like the Republic of Indonesia, Taiwan, Korea, as well as the nation of Thailand, which used only 130,000 tons in 1960 (or 1.2 percent of the world's total use), used 1.5 million tons in 2002 (7.21 % of the world's total usage). More than two-thirds of world exports are made up of the four largest exporters: the United States, Uzbekistan, Francophone Africa, and Australia. Over the past two centuries, cotton prices have decreased, albeit with intermittent surges. The factors contributing to the prolonged decrease are similar to those typical of most primary commodities. From 1960-64 to 1999-2000, precise cotton prices decreased by 5.5%, mirroring the 50% reduction in the whole agricultural price index of 22 commodities. Average cotton prices varied between $2.53 and $0.82 per kilogram. Cotton prices have shown volatility during their decline. The character of volatility has significantly transformed over the past four decades (M. et al., 2020).

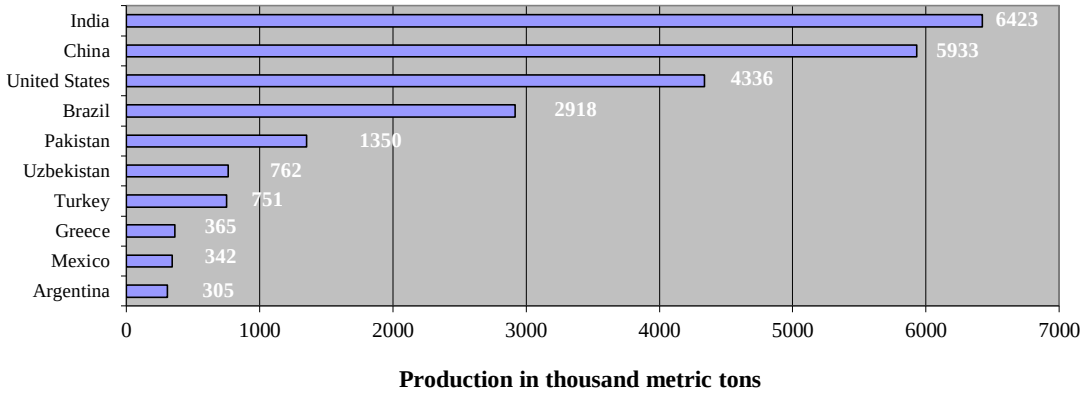


Figure 1.0: Principal cotton-producing nations globally in 2019/2020 (measured in 1,000 metric tons) © Statista 2021 (Source: Shahbandeh, 2020)

To enable cotton farmers to compare their production costs, the International Cotton Advisory Committee (ICAC) compiles statistics. Tanzania, Uganda, and West Africa—especially the nations of Burkina Faso, the Republic of Mali and Benin—are some of the lowest-cost cotton growers, according to the latest survey by ICAC (2001), which derived from a questionnaire including 28 cotton-producing nations. The United States, Israel, and Syria are high-cost producers. Greece and Spain, two European cotton growers, are likely the highest-cost producers globally, despite their absence from the survey (Riello, 2013).

Cotton prices have experienced a fall during the past two centuries, albeit with intermittent surges. The factors contributing to the prolonged fall resemble those affecting most primary commodities: decreased production costs resulting from technological advancements, flat per capita demand, and competition from synthetic alternatives. From 1960–64 to 1999–2003, precise cotton prices decreased by 55 percent, paralleling the 50 percent reduction in the overall agricultural price index of 22 commodities (Janzen et al., 2018).

Over the past 40 years, the output has doubled, rising from 300 kilograms per hectare in the early 1960s to over 600 kilograms in 2000, primarily due to decreases in production costs. The introduction of enhanced varieties significantly contributed to the remarkable increase in production, expansion of irrigation, utilization of chemical fertilizers, and automated harvesting. We anticipate that advances in genetically modified seed technology and precision agriculture, initiated in the late 1990s, will significantly decrease production expenses. Significant technological advancements have transpired in the textile industry, enabling factories to achieve equivalent fabric quality using inferior-grade cotton. This

tendency applies to numerous items whose principal input is a primary commodity (Voora et al., 2020).

Over the past decade, nominal cotton prices varied from $2.53 per kilogram in May 1995 to $0.82 per kilogram in October 2001. The post-1996 price decline resulted from multiple factors, including surplus production in 1997-98; diminished demand from East Asian textile manufacturers impacted by the 1997 financial crisis (Indonesia, the Republic of Korea, and Thailand collectively represent approximately 15 percent of cotton import demand); unprecedented stock levels, peaking at 9.8 million tons in 1997-98, which elevated the stock-to-use ratio to 0.51, the highest since 1985-86; and reduced chemical fiber prices due to currency devaluations among several East Asian producers (Riello, 2013).

Cotton prices have exhibited volatility during their descent. The character of volatility has significantly transformed during the past four decades. A basic assessment of volatility shows that from 1985 to 2002, it was 2.5 times higher than from 1960 to 1972, but only half as high as from 1973 to 1984. Countries traditionally producing cotton are located in the Northern Hemisphere, contributing to approximately 90 percent of global output (Wegier et al., 2016).

Numerous African cotton-producing nations, particularly in East Africa, implemented significant reforms. These reforms have yielded varied results, which in some ways mirror the outcomes of reforms in other commodity sectors (Delpeuch & Leblois, 2014).

Nonetheless, the delivery of public services, encompassing research and extension, has declined. On top of that, credit recovery rates got worse as reforms usually led to the end of parastatals that had monopolistic power, which decreased input utilization (Booth et al., 2014).

The cultivation of cotton in Africa is influenced by international politics, colonial power, environmental variables, and often coercion, encompassing the reasons for its growth, the specific places, the cultivators, the quantities produced, and the techniques employed. Commercial cotton cultivation in Zimbabwe commenced in the early 1920s. Enhanced technology in insect management and the creation of superior seed varieties augmented production, transforming Zimbabwe into a significant cotton producer. The cotton sector in Zimbabwe exemplifies the successful integration of previously disenfranchised black individuals into the state-organized single marketing system post-1980, facilitated by the extension of this system to communal areas. In 1986, the number of cotton growers exceeded 150,000, indicating a fourfold growth since 1980. This notable achievement, however, incurred significant budget deficits due to a policy of subsidized lint sales to local spinners and the elevated costs associated with servicing numerous dispersed smallholder farmers (Sneyd, 2017).

The nation of Uganda produces cotton as an ancient income crop. It is used as a raw material for the local textile as well as edible oil industries as well as an export commodity. According to estimates from the Cotton Development Organization (CDO), the cultivation and sale of cotton's main products, among them textiles and clothing, as well as its by-

products, like soap, oil for cooking, and feed for livestock, employs about 2.5 million people directly and indirectly throughout the value chain (Lugojja, 2017). Known as the "Pearl of Africa," Uganda is an East African landlocked country. The British Colonial Government introduced cotton to Uganda in 1903 as the inaugural cash crop, typically cultivated on small plots of less than half an acre and frequently intercropped with other food crops (Delpeuch & Leblois, 2014). Production expanded until the mid-1930s, when coffee emerged as a competing cash crop. In 2003, a comprehensive plan for input provision failed to materialize, the output market remained intensely competitive with numerous small purchasers, and production stagnated at approximately 20,000 MT.

By mid-1930, production surpassed 60,000 metric tons (MT) (Wendel & Grover, 2015). During colonial administration, a highly divisive strategy to promote cotton output involved the imposition of a poll tax to support the British textile sector. In 1933, the Cotton Control Board (CCB) greatly increased government controls with the implementation of the Cotton Zone Ordinance. According to Adhikari et al. (2015), the Ordinance established fourteen zones, each of which was given a ginnery with exclusive access to the crop within that region. This substantial government intervention may shield farmers from significant price drops; yet, it ultimately favored grains by compelling farmers, reliant on government price safeguards, to cultivate cotton rather than other profitable crops. After Uganda gained independence in 1962, cotton production reached its zenith at 84,000 metric tons in 1969. Inadequate business methods compelled cooperatives to purchase cotton on credit, resulting in delayed payments to farmers. Price volatility emerged when cotton markets globalized in the 1970s (Janzen et al., 2018). Globalization resulted in the disintegration of production.

For ginneries to achieve sustainability, the cotton prices remunerated to farmers must incentivize cotton cultivation while ensuring the profitability of the ginnery (Chell, 2013). Control of the cotton industry (2012). Following the deportation of Asian Ugandans in 1972 as well as the succeeding Properties as well as Businesses (Acquisition) Decree of 1973, there was further degradation throughout the Amin government (1971–1979) (Dejung & Cohen, 2018). During this period, cotton production stabilized at around 78,000 MT, indicating a slight decline from the peak of 84,000 MT in 1969 (Baffes & Maratou-Kolias, 2013).

Production of cotton fell to 14,000 MT in 1976. According to Ahmed and Ojangole (2019), the greatest decrease in Uganda's independent history occurred during the price fluctuation of 1974–1975. After its decline in the 1970s, cotton production plummeted to a historic low of 2,000 MT in 1987. In 1986, a new administration assumed control and reformed the Lint Marketing Board (LMB), leading to the complete liberalization of marketing, processing, and export activities in 1994 (Booth et al., 2014). Liberalization led to the conduct of cotton sales on a cash-on-delivery basis, enabling farmers to sell to the highest bidder. The privatization of cooperative union ginneries raised the total ginning capacity from 100,000 bales in 1994/95 to exceeding 900,000 bales. Production increased consistently, from 33,000 bales in 1994/95 to a post-liberalization peak of 254,036 bales in 2011/12. Baffes and Maratou-Kolias (2013) estimate that 250,000 households cultivate cotton.

Commercial cotton cultivation in Zimbabwe commenced in the early 1920s, with the establishment of an extensive cotton research program and a research station in 1925.

Enhanced technology in insect management and the creation of superior seed varieties augmented productivity, establishing Zimbabwe as a significant cotton producer in Africa. Initially, a committee within the Grain Marketing Board oversaw the marketing of cotton. The Cotton Marketing Board, founded in 1969, regulated nearly all facets of cotton production until 1994, encompassing the sale of planting seeds and the procurement of cotton from farmers (Matthews & Tunstall, 2019).

In the nation of Zimbabwe, the cotton industry is a success story that, after 1980, successfully included black people who had previously been disenfranchised into the state-organized unified marketing scheme. The introduction of the one-channel selling scheme into neighborhood communities led to a fourfold increase in registered cotton producers since 1980; in 1986, there were over 150,000 of them. The Cotton Marketing Board (CMB) generated over 250,000 tons of seed cotton during the 1985–1986 marketing season, mostly from local regions. Before the beginning of 1992, the Cotton Marketing Board (CMB) oversaw and controlled every aspect of the system, including the sale of lint and the initial purchase as well as shipment of inputs at the gate to the farm. Historically, this procedure guaranteed producer prices that were adequately profitable to encourage heightened production, particularly in communal areas. Unlike maize, cotton producers have fully capitalized on the collaboration between the two primary farmer organizations to enhance costs (CCGA & ZFU, May 2000).

The Cotton Marketing Board (CMB) of Zimbabwe was founded in 1967, at the outset of Rhodesia's unilateral assertion of independence from Great Britain. The Board exercised

monopolistic control via the procurement of seed cotton for lint export and the establishment of regulated pricing through agreements involving the legislature and the Rhodesia National Farmers Union, which later changed its name to the Commercial Farmers Union (Mujeyi, 2013). The new government methodically reorganized financial services, buying depots for small-scale cultivators, and extension services for agriculture after the formation of black majority rule in 1980. Large-scale commercial farmers accounted for more than 90% of cotton production in 1980 as a result of this alteration, with the smallholder sector accounting for around half by the end of the decade. The increase in the number of farmers, which tripled due to the inclusion of smallholders, resulted in a significant rise in total production, from an average of approximately 150,000 MT of seed cotton between 1980 and 1983 to over 250,000 MT between 1988 and 1991. In contrast to numerous regional parastatals, corruption does not seem to be a significant issue within the CMB (World Bank, 1992). Stringent grading determines farm prices, with smallholders in southern and eastern Africa receiving the highest average prices (Mangieri, 2019a). The government sustained substantial expenditure in varietal development and facilitated widespread access to loans via the Agricultural Finance Corporation. Consequently, smallholder production reached the greatest levels in the region, with average yields of over 700 kg/ha. Zimbabwe maintained a favorable market position and a price premium of almost 10% in global markets through rigorous quality control. This notable achievement, however, incurred a significant budget deficit due to a policy of subsidized lint sales to local spinners and the considerably elevated expenses associated with servicing numerous dispersed smallholder farmers. Issues plagued Zimbabwe's cotton sector by 2005, despite a significantly greater concentration within the country's system.

Given the present conditions, it is improbable that the industry will sustain its exemplary support for farmers, elevated smallholder production, excellent credit payback rates, and superior lint exports (Tausif et al., 2018).

German settlers introduced cotton to Tanzania in 1904 as a plantation crop, but the endeavor proved unsuccessful. In the 1920s, initiatives concentrated on smallholder production, initially in eastern Tanzania and subsequently in western Tanzania. 350,000 to 500,000 farmers, each possessing between 0.5 and 10 acres, primarily cultivate cotton on small farms in rain-fed regions. The Western and Eastern growing areas (WCGA and ECGA, respectively) account for approximately 98% of the production in Shinyanga, Mwanza, Tabora, Mara, Singida, Kagera, and Kigoma (J. et al., 2015). ECGA encompasses: Morogoro, Manyara, Coast, Tanga, Iringa, and Kilimanjaro (Coulson, 2016).

A cultivar that is immune to pests was created in the 1930s as a result of local investigation. The production of cotton, particularly in western Tanzania, significantly increased due to the introduction of these regional cultivars and enhanced sector structure following the formation of the Tanganyika Lint and Seed Marketing Board in 1956. In 1966, Tanzania's cotton production reached 80,000 tons, constituting 0.75 percent of global output. Independent Asian entrepreneurs owned gins in Tanzania (Baffes & Maratou-Kolias, 2013). Prior to 1994, Tanzanian farmers' seed cotton was marketed by primary cooperative societies (PCSs) while ginning was handled by regional cooperative unions (RCUs). After that, RCUs sold the fibers to the Cotton Board and gave the PCSs back some of the ginned cotton seeds to distribute to farmers. A significant amount of cotton remained unharvested

or unginned. Gibbon indicates that seed cotton production declined from an average of over 200,000 metric tons from 1971 to 1975 to approximately 130,000 metric tons throughout the 1980s, while the indebtedness of the Cotton Board and RCUs surged. East Africa's Tanzania is considered the most successful cotton producer in the region and among the top producers in Sub-Saharan Africa. In Tanzania, domestic cotton lint consumption constituted 38% in the 2013/14 period (Adams, 2015). Tanzania possesses a substantial textile and garment industry. However, the industry is still relatively small in both regional and global contexts, primarily due to outdated machinery that negatively impacts production, quality, and consistency. Tanzania has approximately 25 textile and garment production companies, with around 50% of ginners engaged in spinning. Regional markets, such as Kenya, Uganda, and Zambia, constitute 84% of Tanzanian textile exports, with Kenya importing almost 50% (Staritz & Tröster, 2015).

Prior to the nation's political independence in 1963, Adhikari et al. thoroughly recorded the historical context of cotton production in Kenya. Between 1907 and 1978, cotton output in the country saw fluctuations, with the coastal region of Kenya being a notable contributor throughout that period. Kenya depends significantly on the agriculture sector for economic and social advancement (Ogot and Ochieng', 1996). The sector is essential since it serves as the principal source of food security and employment for more than two-thirds of the Kenyan populace (KARI, 1998; GoK, 2010). Often, people limit the role of men in agriculture to land management (Rutto et al., 2022).

Agriculture is the cornerstone of Kenya's economy, accounting for approximately 26% of the nation's GDP and almost 65% of its export revenues. It accounts for 27% of Kenya's GDP through interconnections with other sectors. Smallholders, who primarily supplement their food production with cash crops that require lower nutrient inputs and management levels, are the primary producers. Crops with limited resources that enhance livelihoods include cotton. Cotton, mostly cultivated for its lint, is the preeminent fiber crop globally, constituting 90% of total fiber production and serving as the catalyst for the majority of textile companies worldwide. Nonetheless, cotton output in Kenya has not exhibited a consistent increase trajectory from 1960 to 2017 (Lorenzetti, 2022).

A private firm, with the support of the British Cotton Growing Association, introduced cotton to Kenya in 1906. In 1922, the Government of Kenya (GoK) endeavored to revive cotton cultivation in viable regions, particularly Nyanza and Western provinces, establishing two ginneries at Asembo Bay and Malakisi in 1933 (Kubyanukula, 2022). Kenya cultivates medium- and short-stapled cotton cultivars for the home market. Nonetheless, the environment also influences the disparities in lint quality among types. Farmers grow cotton along the shore, and hola yields longer lint than the same kind in Western Kenya. Irrigation maintains soil moisture at a consistent level, promoting continued growth of the cotton plant and yielding longer, finer lint. In rain-fed cotton regions of the Lake Victoria Basin, regular fluctuations in soil moisture regimes are likely to result in variations in lint quality. This scenario indicates the necessity for irrigated cotton in the region to enhance lint quality (Rutto et al., 2022).

Until 1991, the Cotton Board of Kenya predominantly governed the cotton sector. The Board possessed monopolistic authority over all regulatory facets, including import and export licenses, quality control, and the provision of planting seeds via ginneries. In 1991, the government opted to liberalize the sector and permit private investors to engage in the cotton industry. The sudden liberalization of the cotton, linen, textile, and apparel business rendered the Cotton Board of Kenya obsolete in its function within the sector. Nevertheless, no alternative organization emerged to provide essential regulatory and coordination functions. In addition, the industry requires a comprehensive institutional plan of action, a regulatory and legal structure that aligns with the present liberalized setting a policy framework that encompasses the entire cotton-lint-apparel chain of value, as well as a policy for employee growth and adaptation. A policy for strategic positioning is conspicuously missing. Consequently, despite the evolving global dynamics of the cotton-lint-textile-apparel chain, there is an absence of strategic reaction within the country, leading to deteriorating terms of trade for its producers (Mulwa et al., 2013).

Kenya produced 4,000 bales, increasing to 9,000 in 1935, 15,000 in 1936, and 20,000 in 1938. The present output of approximately 5,000 bales precedes the 1938 production by 65 years. The national demand for cotton currently amounts to 120,000 bales annually. We anticipate an annual rise of 15 to 20% in this demand forecast following the implementation of AGOA. The 2006 enactment of the Cotton Development Authority statute showed a significant increase in cotton production after a sustained decline. Data from CODA and the 2012 USDA-FAS indicated that cotton output in Kenya saw a yield fluctuation between 32,000 and 49,000 bales from 2006 to 2014 (James, 2016). The surge in production followed the enactment of the Cotton Development Authority bill in 2006. The Cotton

Development Authority strengthened following the African Growth and Opportunity Act of 2009. Although Kenya has not fully utilized the African Growth and Opportunity Act, a 2018 assessment found that the act has the potential to double Kenya's cotton exports for textiles to the United States (Cook & Jones, 2015). The nation possesses around 350,000 hectares conducive to rain-fed cotton cultivation, with the capacity to yield in excess of 260,000 bales per year. The capacity for cultivating irrigated cotton is around 35,000 hectares, with the ability to yield over 100,000 bales each year. The nation is generating fewer than 50,000 bales of lint annually. The seed types in the country yield 2500 kg of cotton per hectare for seed cotton and 4000 kg for rain-fed and irrigated cotton, respectively (CODA, 2017).

The government's Vision 2030 agenda identifies cotton as a critical sub-sector essential for economic revival. Presently, national production levels are persistently low, consistently declining below 18,000 bales. This necessitates the importation of 182,000 bales of cotton lint to satisfy the textile industry's annual demand of 200,000 bales (CODA, 2012; USDA-FAS, 2017). This output trend suggests that numerous obstacles persist in cotton production, notwithstanding the government's initiatives to rejuvenate the sector. During the same timeframe, Tanzania and Uganda, neighboring countries of Kenya with analogous agro-ecological zones and climate, yielded 500,000 bales and 250,000 bales, respectively, from 2008 to 2009, but Kenya failed to produce even 50,000 bales in that period (Verheyen et al., n.d.-a).

Agriculture is an essential endeavor in Kisumu County, accounting for about fifty percent of total household incomes. Upon gaining independence in 1963, private enterprises predominated the business. In the ensuing decade, the government provided assistance to cooperative organizations in acquiring private ginneries from colonial proprietors, implemented a system of regulated margins, and established fixed farm-gate cotton prices. The government also invested in multiple textile mills that served the predominantly private textiles and clothing sector, including KICOMI (Kisumu Cotton Mills) and Rift Valley Textile Mills (RIVATEX), during a period of substantial donor support. Cotton-lint production increased from 24,000 bales in 1965/66 to 70,000 bales in 1984/85, reflecting a 190% rise in lint production and a 60% enhancement in processing capacity throughout the 1970s (Cook & Jones, 2015). Donor support began to diminish in the mid-1980s, leading to a 57% decrease in lint production from 1984-85 to 1992-93. When the government initiated the liberalization of the business in 1991, cotton production had nearly ceased; numerous ginneries had either failed or were operating at over capacity, and many textile companies had similarly collapsed. The issue intensified in 1994 when the United States imposed an import embargo on Kenyan textile products, exacerbated by the rise of used clothes imports into the country (Textile, 2013).

Agriculture yields both food crops and cash crops, contributing to reducing food insecurity. The majority of producers are small-scale farmers due to the limited size of their land. At 48%, Kisumu now has the highest average percentage of poverty among urban areas, much above the national average of 29%. Compared to Nairobi (8.4%), Mombasa (38.6%), as well as Nakuru (30%), Kisumu, a net importer of food, has one of the worst rates of

shortages of food as well as poverty, with 53.4% of its people living underneath the poverty threshold. The primary cash crops cultivated include sugar cane, cotton, rice, and local vegetables (MoALF, 2017). Cotton significantly contributes to the income of both cotton-growing regions and the county. It is socially inclusive and culturally acceptable. In addition to elevated poverty and food insecurity levels, farmers contend with inadequate labor, insufficient extension services, lack of farm inputs, weak connections to input and output services, inadequate government support, poor health, and high illiteracy rates (Voora et al., 2020).

Cotton production has experienced a prolonged decline over several decades. In 2012 and 2013, 66 hectares of cotton yielded 82,000 kg. In 2014, this area diminished to approximately 37 hectares, resulting in a yield of 46,000 kg. The trend continued in 2015, with cultivation decreasing to 20 hectares and a yield of 24,000 kg. By 2016, the area further contracted to 12.7 hectares, yielding 13,694 kg. Notably, in 2016, the acreage increased slightly to 14.2 hectares, with yields rising modestly to 17,759 kg. In 2017, both the area and yields nearly doubled to 25.8 hectares and 32,150 kg, respectively. Consequently, there appears to be no discernible trend of increasing or decreasing cotton production over the years, and any fluctuations are minimal. Overall, cotton production has consistently declined from 2012 to 2018 (CODA, 2012; AFFA, 2017) (Rutto et al., 2022).

In 1964, the Khatau Group of India and the Development Finance Company of Kisumu successfully founded KICOMI, a well-known brewery in the county. It created job opportunities for residents who bought and processed cotton from farmers. The market

made the finished products available. Industries that use cotton and its end products also benefitted, paving the way for county industrialization. As a result, cotton producers and industry workers received good incomes to support their families and improve their living standards, reducing poverty for those directly and indirectly involved in the cotton industry. The industry's success led to the region's social and economic development. The sudden closure of KICOMI and associated factories, such as the Kibos industries and Nyanza ginnery, along with farmers' near abandonment of cotton growing, significantly negatively impacted the region's social and economic development. This was due to the loss of employment opportunities and a lack of a market for the cotton produced by the farmers. The closures were unavoidable due to the insufficient quality and quantity of cotton produced to sustain the factories. Following the closure of KICOMI (Kisumu et al.) and associated factories in the 90s, cotton farming took a nosedive, and farmers almost abandoned cotton farming. The once-thriving cooperative stores turned to other uses, such as worship places and community halls. (Kisumu Cotton Mills (KICOMI)—Macleki, 2019).

The Brazilian government sought to revive cotton production in the East African region by setting up a laboratory in Kisumu that will generate a variety of certified cottonseeds and other components. According to Carlos Henrique, the coordinator of the Brazilian Agricultural Research Corporation, the project was intended to be a regional one, with Kisumu selected as the center (Clarence-Smith, 2014). "After a scoping mission in Kenya, Tanzania, and Burundi to put together a project for cotton development, we decided Kisumu County will be the center of the project," Henrique said. He further stated that the project aimed to support the research and use the latest technology to generate certified

cotton seeds and different crop management techniques. "The idea was to bring different pools of technology and cotton varieties to the local farmers and, at the same time, sensitize them about crop management," added Henrique. Kisumu County Executive for Agriculture and Fisheries, Stephen Orot, said that for a long time, cotton production had gone down because of the importation of second-hand clothes, and the variety of cotton grown is of low quality (Ngundo & Chitere, 2015). He further said that his ministry, in partnership with KARI, will work closely with other seed companies, such as Kenya Seed Company and Amiran, to improve the variety of seeds. Orot said the project also seeks to add value to the cotton chain to ensure quality fiber, cottonseed oil, and cottonseed cake (J. Kabissa et al., 2022). The study aimed to examine the impact of various social and economic factors on sustainable cotton production in Kisumu County.

1.2 Problem Statement

Cotton production in Kisumu County is a pivotal factor in realizing Vision 2030. It facilitated the establishment of factories reliant on cotton and its by-products as raw materials. These factories generated employment, procured and processed cotton from farmers, and supplied finished products to the market, fostering industrialization in Kisumu County. Farmers, factory workers, stakeholders within the cotton value chain, and those directly or indirectly associated with the cotton industry benefited from substantial incomes, enabling them to support their families, educate their children, enhance their livelihoods, and alleviate poverty. The decline and near cessation of cotton production, culminating in the closure of KICOMI and related industries, significantly undermined the

region's social and economic development. Consequently, it is imperative to investigate the causes of this unfortunate situation in Kisumu County.

1.3 Rationale for the Study

Cotton's potential for income generation, environmental resilience, employment creation, and value addition justifies the undertaking of this study in Kisumu County (SIVCAP, 2020). Its success will lead to the return of cotton production in Kisumu County, bringing back Kisumu's lost glory, reducing poverty, and helping to industrialize the county. This success will lead to the significant development of Kisumu County. The study will bring to the fore the main social and economic factors in cotton production and assist Kisumu County and the national governments in their planning. The study will also highlight how socio-economic factors influence sustainable cotton production and evaluate the interventions that contribute positively and negatively to sustainable cotton production in Kisumu County. The study will contribute to research advancement by laying bare the incentives that contribute to sustainable cotton production in Kisumu County. We can conduct further research in other jurisdictions to ascertain whether the same factors play a crucial role in shaping sustainable cotton production in various regions and settings in Kenya where cotton cultivation occurs.

1.3.1 Scholarly Rationale

Researching sustainable cotton production in Kisumu County offers a significant opportunity to tackle local and global agricultural and sustainability challenges. The unique ecological and climatic conditions of Kisumu affect cotton production in ways that differ from other regions in Kenya. This localized research can yield more effective strategies

than broader national studies. Developing sustainable practices tailored to Kisumu's specific conditions (such as soil types, rainfall patterns, and local biodiversity) can improve cotton yield and quality while reducing environmental impact.

Agriculture is a vital sector in Kenya, and cotton has historically played a significant role in rural economies and development. Emphasizing sustainable practices in Kisumu could revitalize the local economy and offer scalable models for other regions. Sustainable cotton production may result in more stable employment opportunities in agriculture, enhance livelihoods, and alleviate poverty in rural areas. Examining how socio-economic factors influence farmer income and welfare in Kisumu is crucial. Cotton cultivation is resource-intensive, especially regarding chemical inputs. This research may uncover sustainable agricultural practices that diminish resource consumption and reliance on synthetic inputs, essential for long-term ecological integrity. Sustainable methods can preserve or augment biodiversity, which is critical for ecological resilience. Evaluating the impact of these practices on local biodiversity in Kisumu can yield valuable insights. Given the persistent effects of climate change, developing cotton production practices resilient to evolving climatic conditions is crucial. Research in Kisumu County may reveal adaptive agricultural techniques that sustain productivity amidst temperature variations, erratic rainfall, and severe weather phenomena.

By offering evidence-based suggestions tailored to Kisumu, this study may guide subsequent research and serve as a reference for local and national agriculture policies. Comprehending local cultural practices and community perspectives on cotton production and sustainability is essential for fostering the adoption of sustainable technologies. This

research can yield insights into these dynamics, facilitating more effective community involvement tactics. This research pertains to Kisumu County, but its findings may serve as a model for other cotton-producing locations in Kenya and beyond that share analogous geographical and socio-economic traits.

1.4. Objective of the Research

This study evaluates the impact of various socio-economic factors contributing to the decline and near cessation of cotton production in Kisumu County. The findings resulted in the closure of KICOMI and associated industries, significantly affecting Kisumu County, Kenya's social and economic development.

1.4.1 Primary aim of the research

Evaluate the impact of various socio-economic factors on sustainable cotton production and development in Kisumu County, Kenya.

1.5 Specific Objectives

a) Assess how social factors such as religion, gender, and cultural beliefs influence sustainable cotton production and development in Kisumu County, Kenya.

b) The aim is to assess how economic factors and the proximity to purchasing hubs influence sustainable cotton production and development in Kisumu County, Kenya.

c) To assess the measures implemented and their impact on sustainable cotton production and development in Kisumu County, Kenya.

1.6 Research Inquiry

Do social factors, including religion, gender, cultural views, and economic ones, such as market conditions, proximity to purchasing hubs, and existing initiatives, affect the sustainable production of cotton in Kisumu County?

1.7 Research Hypotheses

H01: Gender does not substantially impact cotton production or the sustainability of development in Kisumu County, Kenya.

H02: Religion does not substantially influence cotton production and the sustainability of development in Kisumu County, Kenya.

H03: Cultural beliefs do not substantially impact cotton production and development sustainability in Kisumu County, Kenya.

H04: Marketing and proximity to purchasing centers do not significantly influence cotton production and the sustainability of development in Kisumu County, Kenya.

1.8 Assumptions of the Study

a) The cotton producers consulted willingly provided information regarding constraints and opportunities in cotton production.

b) The community members consulted were willing to provide information regarding the constraints and opportunities in cotton production.

a) The respondents might articulate their responses either in writing or verbally.

1.9 Study Scope

The study area was in Kisumu County's five cotton-growing sub-counties with black cotton soil: Nyakach, Nyando, Muhoroni, Kisumu East, and Seme. The socio-economic factors are religion, cultural beliefs, gender issues, marketing, health, labor, farm sizes, education, infrastructure, and distance from the buying centers. Sustainable cotton production manifests in acreage under cotton, cotton output, and the presence of ginneries. Moderating/intervening factors manifest in rainfall intensity, seed quality, competition from other products, and policy issues. The sample had two hundred and ninety-three respondents: cotton producers, KALRO staff, CODA staff, extension officers, cooperative department staff, and administrative staff. The study collected data from July to August 2019 using a mixed research design. Kisumu County's consideration for the study was due to the phenomenal growth in the cotton industry in this county over the last decade. Sustainability data for the last seven years forms part of the study.

1.10 Constraints of the Research

Several limitations faced the study: inadequate literacy levels required the use of a community interpreter; financial constraints impacted the research; the snowball sampling method expedited data collection; there was a lack of specific transport cost data related to cotton; there was insufficient information about the relationship between ginners and spinners; and there was a lack of data on the quality disparity between local and imported lint. The researcher and assistants adequately clarified these issues to the respondents.

1.11 Conceptual framework

Based on the preceding background, the conceptual framework in Figure 1.2 shows the interaction between the study variables.

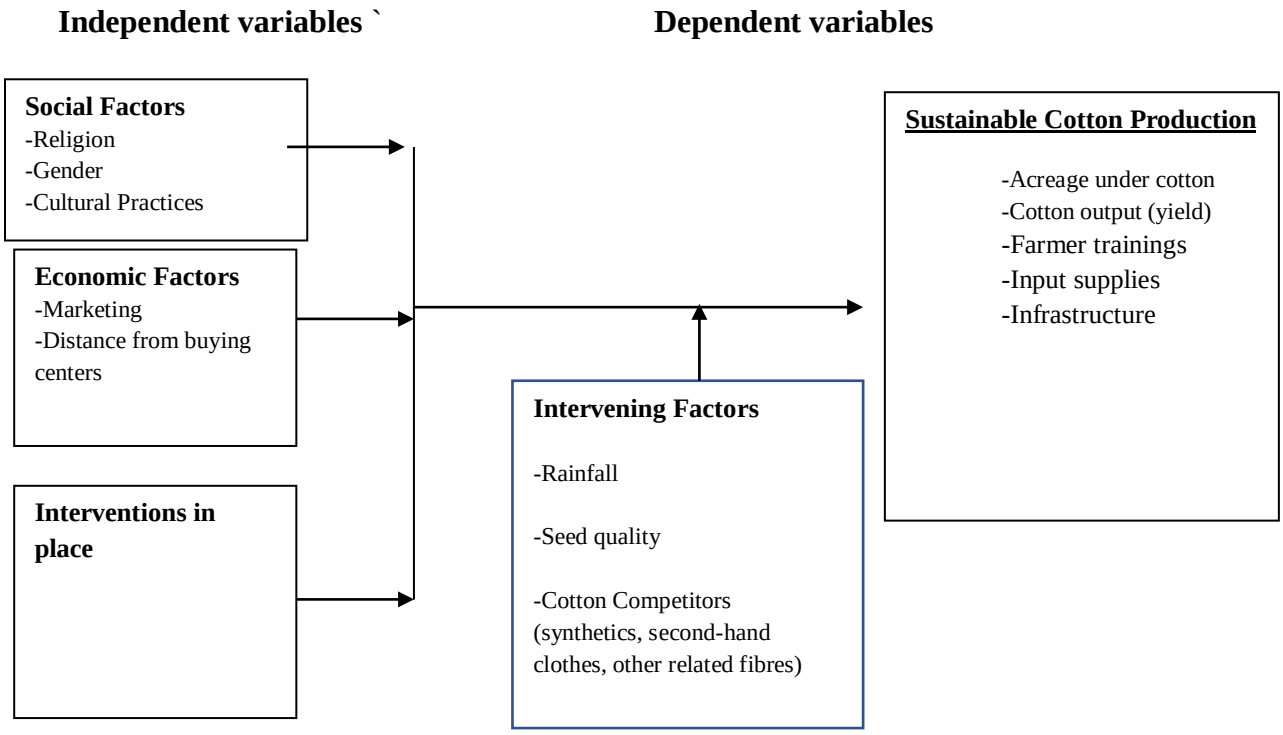


Figure 1.1: Conceptual Frameworks (Source: Researcher (2017)

The independent variables identified in the conceptual framework were social factors, economic considerations, and existing interventions. The dependent variables were markers of sustainable cotton production: cotton acreage, yield, farmer training, input supplies, and infrastructure. Intervening elements include precipitation, seed quality, and competitors to cotton, such as synthetic materials, second-hand garments, and other associated fibers, as

well as regulatory considerations. Independent factors can either positively or adversely affect dependent variables.

1.12 Theoretical Framework

1.12.1 Systems Theory

Ludwig Von Bertalanff established systems theory from 1901 to 1927, and Talcott Parsons further developed it from 1902 to 1979. This thesis investigates the application of systems theory to cotton production, aiming to understand and improve the dynamics that govern this crucial industry (Ramage & Shipp, 2020). Systems theory embraces a holistic viewpoint, regarding the entire cotton production process as a cohesive entity. The theory encompasses the entire cotton value chain, recognizing that every element, ranging from soil and climate to cultivation techniques and market dynamics, influences and influences others. The cotton production system comprises interrelated components, including farmers, land, climate, and markets, which interact in complex ways. Systems theory facilitates the identification and modeling of these interactions, thereby enhancing comprehension of their impact on the overall system (Zhang & Ahmed, 2020). Integrating systems theory into this thesis provides a comprehensive framework for studying and enhancing the cotton production system. It facilitates the examination of complex interrelations among many components, finds leverage areas for action, and aids in formulating plans that improve the sustainability and resilience of cotton production in Kisumu County. Cotton, a multifaceted and economically vital crop, is essential to the economies of numerous African nations. The cotton production system is a complex

network of interrelated parts and processes, shaped by several internal and external influences. (Zhang & Ahmed, 2020). Cotton is a significant fiber worldwide. Its production is an essential element of the worldwide textile industry and is not simply an isolated agricultural activity. Various interrelated elements affect cotton, a multifaceted system within the textile industry. Systems theory constitutes a fundamental principle in this thesis. It offers an extensive framework for comprehending intricate occurrences in cotton production. This paradigm perceives systems as interconnected elements functioning collaboratively within a broader framework, highlighting their interactions and interdependencies. It encompasses the subsequent fundamental points: Systems theory emphasizes feedback loops, both positive (reinforcing) and negative (balancing), which can enhance or mitigate systems, value chains, and behaviors. The loops are crucial for comprehending how alterations in one system component can influence the entire system (Hammond, 2019). Systems theory acknowledges that system behavior frequently exhibits non-linearity, indicating that minor alterations in one component can result in disproportionately substantial consequences. Comprehending this is crucial for forecasting and regulating system reactions (Van Assche et al., 2019). Systems frequently display emergent qualities, traits, or behaviors arising from the interplay of various components. Recognizing these emergent features is essential for a thorough comprehension of the system's behavior (Zhang & Ahmed, 2020). Systems theory is robust since it offers insights into how systems endure disruptions, adapt, and modify to evolving conditions. This knowledge can guide initiatives for guaranteeing the sustainability of cotton production (Ridder, 2017). Systems theory promotes an interdisciplinary methodology, recognizing that cotton production encompasses several domains, such as agriculture, economics,

environmental science, and sociology. Incorporating ideas from various disciplines improves comprehension of the system's complexity (McIntyre, 2016). Systems theory can facilitate the formulation of evidence-based policies and actions. Due to its breadth and potential unexpected repercussions, decision-makers can formulate more effective and sustainable strategies for enhancing cotton output. Systems theory emphasizes that the behaviors of this cotton production system are primarily non-linear. Marginal modifications, like subtle enhancements in irrigation techniques, might result in disproportionately significant increases in output. Comprehending these nonlinear dynamics is essential for forecasting the system's response to different interventions. The ultimate beneficial impact of enhancing the quality and augmenting the quantity of cotton, for instance, through the implementation of water-saving irrigation techniques, may bolster market competitiveness and consequently stimulate increased investment in sustainability. Moreover, emergent qualities constitute the fundamental characteristics of cotton production. Complex interactions among system components give rise to this trait or behavior, making it impossible to comprehend by examining its individual elements (Zhang & Ahmed, 2020). Resilience among cotton farmers in Kisumu may arise from integrated social networks, indigenous knowledge, and market accessibility that foster a conducive environment for sustainability. Utilizing systems theory will enable these stakeholders to formulate targeted plans that promptly tackle difficulties and improve the overall resilience and sustainability of cotton production. This comprehensive understanding will facilitate evidence-based policy decisions that account for the intricacies of the cotton production system.

1.13. Operational Definition of Terminology

Producer Organizations: Farmers own and govern these entities, also known as farmer organizations, and participate in collective marketing initiatives (Penrose-Buckley, 2007).

SIVCAP: Strategic Integrated Value Chain Action Plan

Societal Institutions: Consistent behavioral norms outside the formal framework define societal institutions (Sen, 2007; as cited in Jutting and Morrison, 2009).

Value Chain: The value chain encompasses the complete sequence of organizational actions that enhance value at each stage, commencing with acquiring and processing raw materials and concluding with the delivery of the finished product to end consumers.

Women's empowerment: The process of enabling women to achieve parity with men and to participate equally in developmental processes, thereby achieving equal control over the factors of production, is known as women's empowerment.

BT Cotton: Also known as Bacillus thuringiensis cotton, it has been inoculated with Bacillus thuringiensis. This naturally occurring soil bacterium serves as a biological insecticide.

FOB stands for "Free On Board," which indicates that either the sender or the recipient is responsible for any damage costs.

Sustainable production: Involves creating goods and services through techniques that reduce adverse environmental effects, save resources, and emphasize social responsibility.

It seeks to meet present requirements without endangering the ability of subsequent generations to meet their own.

Interventions are actions or procedures that are implemented in the realm of sustainable production to enhance the sustainability of production processes or systems.

Social factors: Variables that significantly influence sustainable production by affecting the impact of production processes on communities, workers, and society at large. They guarantee sustainable manufacturing methods are ecologically sound, socially accountable, and just.

Economic factors: Are essential in sustainable production; they affect sustainable practices' feasibility, competitiveness, and enduring success. They reconcile environmental and social goals with economic factors to facilitate the extensive adoption and scalability of sustainable manufacturing techniques.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The initial section of the chapter aims to present an overview of the global backdrop regarding social and economic issues and interventions affecting cotton production at the global, international, and regional levels. The second portion examines theoretical literature regarding cotton production in developing nations, particularly in Sub-Saharan Africa (SSA). This section also emphasizes various factors affecting productivity and the empirical models typically employed to analyze production behavior and farmers' reactions to policy incentives. The third portion examines the social, economic, and marketing issues and the interventions affecting sustainable cotton production in Kisumu County. Furthermore, it elucidates the connection between sustainable cotton production and development. The review examines the theoretical frameworks and empirical evidence from similar studies that form the basis for the current investigation into the relationship between socioeconomic determinants and the sustainability of cotton production in Kisumu County, Kenya. The chapter concludes with a summary. The cotton industry is vital. Over 100 million households globally rely on the cotton production industry, predominantly comprising small-scale farmers in developing nations (Staritz & Tröster, 2015). Data from the United Nations indicates that one ton of cotton generates year-round employment for five individuals, a crucial factor for residents in undeveloped regions. Cotton constitutes 61% of Benin's total exports, rendering it the nation's primary product, while in Burkina

Faso, cotton ranks as the second-largest export, following gold. Various countries have cultivated cotton for numerous years due to its economic importance and global demand. It bolsters local economies and generates employment opportunities for millions in the global textile and apparel sectors (Voora et al., 2020). Gossypium refers to the cotton plant. It necessitates a particular moisture level during its initial growth stages but requires a bright, arid atmosphere post-flowering. Consequently, subtropical regions are optimal for cotton cultivation, resulting in market dominance by producers from India, China, the United States, Brazil, and Pakistan (Darekar & Reddy, 2017).

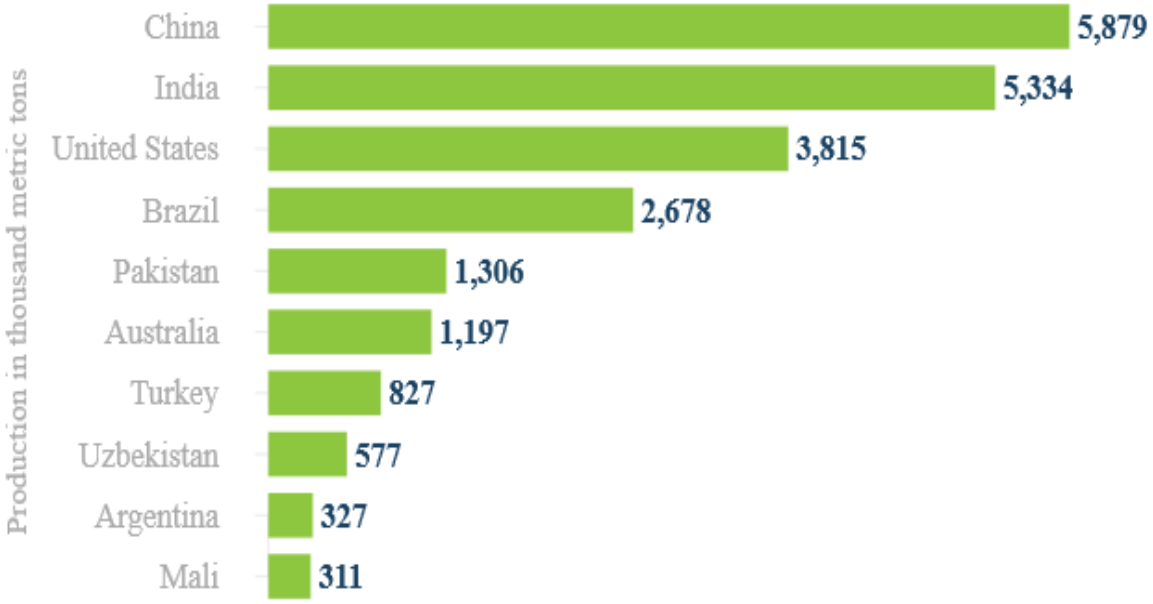


Figure 2.0 Current production of global cotton (in 1,000 metric tons) (Voora et al., 2020)

China is the largest producer, buyer, and importer of cotton globally. Over time, the nation has advanced innovative techniques and technology to enhance efficiency in the sector.

China's cotton sector is characterized by extensive fields, advanced machinery, digitization, and increased yields. In 2021/2022, China recorded a production volume exceeding 5.8 million metric tons of cotton (Johnson et al., 2013a). This nation possesses a lengthy agricultural heritage and a climate favorable for cotton cultivation. It is known for its superior cotton products, and it is believed to have a cotton-producing history exceeding three thousand years. Smallholder farmers constitute a substantial segment of the cotton industry in India. Recent research indicates that India's yearly cotton production has reached 5.3 million metric tons. The United States is a major contributor to global cotton production. It features advanced agricultural techniques, state-of-the-art equipment, and high-quality cotton cultivars. Owing to favorable cultivation circumstances, the majority of the nation's cotton production occurs in states like Texas, California, and Georgia (M. A. Khan et al., 2020). In 2021/2022, the United States produced 3.8 million metric tons of cotton. The nation furthermore imports cotton from significant cotton-producing countries. Brazil possesses an extensive expanse of arable land. Brazil's cotton business has experienced substantial growth in recent years, attributable to advantageous meteorological conditions, investments in cutting-edge technology, labor specialization, and enhancements in agricultural practices. Data indicates that Brazil currently produces more than 2.6 million metric tons yearly (Duarte et al., 2021). Smallholder farmers are the predominant producers of cotton in Pakistan, and the business is vital to the local economy as it generates employment and bolsters the textile sector. Cotton sustains the livelihoods of almost 1.5 million local farmers. Despite the challenges Pakistan's cotton production faces, including pests, water scarcity, and outdated farming practices, government initiatives and technical innovations are driving advancements. In 2021–2022, the nation generated over 1.3 million

metric tons of cotton and ranks among the major cotton exporters (Ali et al., 2019). Cotton significantly influences growth, spanning from China's vast agricultural lands to the flourishing textile industries of India and Pakistan, as well as the United States' advanced agricultural practices and Brazil's remarkable progress. Certain leading producers influence the global cotton market and stimulate economic growth. The significance of cotton production extends beyond mere statistics; it plays a crucial role in local economies, employment generation, and the worldwide textile and apparel industries (Arshad et al., 2021).

2.2 Empirical Review

This study will examine global socio-economic factors, including decision-making processes within households and communities, gender roles, taboos, illiteracy, language, land-use practices, and marketing strategies. Women's unpaid labor has influenced agriculture, extension services, and technology adoption, either adversely or beneficially. Nevertheless, religious affiliation, behavioral habits, attitudes, and apathy influence farming practices. In rural countries, the existence of inflexible, socially enforced gender roles significantly limits women's options for distributing their time between crop production and various paid and unpaid productive and domestic tasks, resulting in time poverty (Giuliano, 2017). Culture, religious beliefs, and societal standards mandate that unpaid domestic and reproductive tasks, including water collection, childcare, cooking, and laundry, are the responsibility of female household members. Women's unpaid labor accurately characterizes the circumstances in rural Africa, as articulated by R. Serra in her

recent study (2009). The impact of this domestic burden on women's economic prospects is detrimental and foreseeable, yet frequently overlooked in initiatives designed to enhance female involvement in remunerative jobs (Davison, 2019). We must acknowledge gender roles as they dictate the access to resources and the nature of that access. Despite women's involvement in domestic, agricultural, and commercial activities, their male counterparts frequently dominate decision-making about household and economic matters. Women perform a significant portion of agricultural labor in subsistence farming. Female laborers predominantly cultivate and harvest cotton manually in Pakistan, making up approximately 65% of the entire workforce, while in India; women are responsible for over 70% of planting and 90% of harvesting activities. The Pakistan Journal of Biological Sciences (PJBS) reported that in 2005, around 2.6 million women harvested cotton in nine core cotton areas in Pakistan (Boserup et al., 2013). In Turkey, women participate in harvesting operations (about 80%); however, in contrast to Pakistan and India, a negligible percentage of women engage in planting activities (under 10%). In India, women are significantly more engaged in applying fertilizers than in Turkey or Pakistan, comprising over 40% of the total workforce. Conversely, female involvement in pesticide usage is higher in Pakistan than in the other two nations. A gender concern corroborates a study published by the Pakistan Journal of Biological Sciences (PJBS) in 2005, which indicated that the majority of women employed in cotton cultivation in Pakistan suffer from illnesses due to pesticide exposure and engage in various on-farm and off-farm activities during spraying (Imran et al., 2018). In field management, India reports a larger percentage of women at approximately 80%, compared to Pakistan at 30% and Turkey at 15%. The proportion of women in the entire workforce within the sector in India, Pakistan, and Turkey is

substantial. In India, women predominantly engaged in agricultural tasks, including seed selection and sowing, stalk removal, weeding, and lint harvesting. Despite being considered menial labor, several occupations require substantial understanding. Female farmers from lower socioeconomic strata demonstrated substantial knowledge on the agricultural tasks associated with each phase of the cropping cycle (Davison 2019).

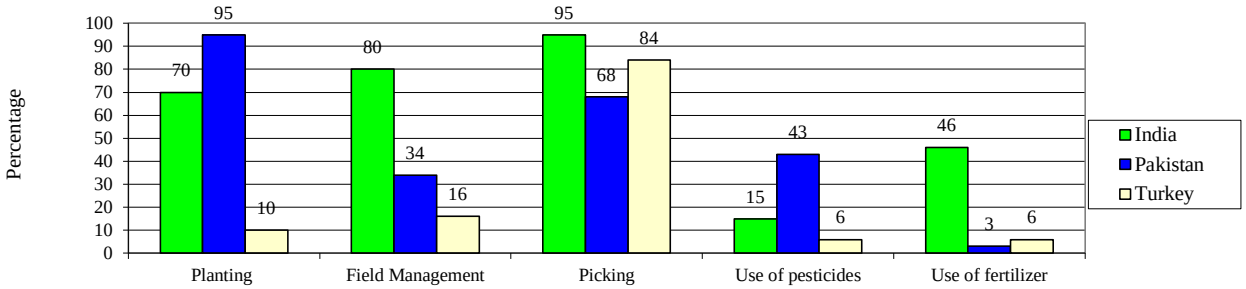


Figure 2.1 Women as a percentage of the total workforce in the cotton sector in India, Pakistan and Turkey (Source: Women in cotton results of a global survey, Dai & Dong, 2014)

Women working in the cotton sector across African regions face similar challenges.

- Insufficient access to finance
- Absence of decision-making autonomy
- Deficiency in property rights
- Inadequate representation
- Involvement in collective organizations
- Elevated health risks associated with pesticide exposure
- Exclusion from national labor legislation protections.

They simultaneously perform some of the most strenuous tasks in the cotton cycle under hazardous, informal conditions, sometimes as day laborers. The Brazilian National Confederation of Agricultural Workers (CONTAG) reports that women constitute approximately one-third of Brazil's agricultural labor force; nevertheless, 85% of these women are employed without contracts and are devoid of legally mandated labor rights or social security (Duarte et al., 2021). Furthermore, while women's remuneration in cotton cultivation typically falls short of that of their male counterparts, FAO Brazil indicates that the average compensation in the rural sector is R$ 257.97 for males and R$ 144.40 for women. Women in smallholder settings frequently engage in essential cotton cultivation tasks, including sowing, fertilization, weeding, and harvesting. Pesticide use jeopardizes women's reproductive health, posing an additional health risk to them. Consequently, women worldwide fulfill three roles: productive, reproductive, and communal management. Multi-tasking results in time scarcity, impacting women's agricultural productivity (Hellen, 2015). The absence of infrastructure, like running water, fuel-efficient stoves, and power, intensifies the disproportionate burden on women. Thus, disparities in the time allocated by women and men to crop production were significant. The likelihood of success for a specific endeavor is somewhat contingent upon the time allocated to it, indicating that the level of risk may be endogenous. Consequently, the limited availability of time for women inherently results in fewer opportunities than men to engage in such endeavors (Boserup et al., 2013). In numerous regions globally, men and women perform distinct tasks. Multiple time allocation studies have investigated which household members undertake specific farm duties (Davison, 2019). These studies frequently categorize certain tasks as masculine and others as feminine. In Kenya, women indicated that men were accountable for

constructing the granary. Conversely, women undertook hand digging, harvesting, and transporting crops (Bryan et al., 2013); nonetheless, the delineation of responsibilities is ambiguous, with both genders participating in numerous chores. Neither men nor women exclusively perform these tasks. Numerous studies investigating time distribution between agricultural and non-agricultural activities reveal that women dedicate more hours than men (Reddy et al., 2021). The examination of the gender division of labor has demonstrated that women generally assume three categories of paid and unpaid labor roles. The productive role encompasses market production and home/subsistence production performed by women, yielding income; the reproductive role involves childbearing and childrearing responsibilities assumed by women, crucial for workforce reproduction; and the community management role includes activities conducted by women to secure resource provision at the community level, extending their reproductive role (Bryceson, 2019). The examination of the gender division of labor has demonstrated that women generally assume three categories of roles concerning both paid and unpaid labor. The division of work in agriculture may vary according to the crop or task, and both forms of gender-based labor division may coexist. While males often solicit the work of women for the plants they control, women may hire men for various agricultural-related activities. According to Khan et al. (2020), these divisions are dynamic and might change in reaction to new economic opportunities. Fernando (1998) asserts that gender roles, including the socio-economic and cultural aspects of being male or female, profoundly shape individuals' activities, resources, and opportunities. Women predominantly assume reproductive responsibilities, including childbearing and household maintenance tasks like cooking, collecting water, and gathering firewood. Moreover, women oversee community resources, whereas men engage in formal

community politics (Bryceson, 2019). We must acknowledge the prevailing lack of awareness regarding women's contributions to Kenya's development, the entrenched cultural beliefs and traditional practices that inhibit women's full participation in the development process, the insufficient technology to alleviate women's workload, and the deficiency of adequately qualified female development agents who can comprehend, inspire, and empower rural women by addressing the substantial barriers to their advancement. The socio-cultural aspects of society include the analysis of decision-making processes, the individuals who make decisions within homes and communities, gender roles, taboos, illiteracy, language, and land-use practices (Lei et al., 2017). This factor adversely affects agriculture, extension services, and the uptake of technology. Nonetheless, religious membership, behavioral habits, individual attitudes, and apathy can influence farming practices. Rigid, socially mandated gender paradigms in rural communities considerably limit women's choices for dividing their time among agricultural cultivation, different paid as well as volunteer productive tasks, and family responsibilities, resulting in time poverty. The impact of this household burden on women's economic prospects is detrimental and foreseeable, yet frequently overlooked in initiatives designed to enhance female engagement in remunerative jobs. Policymakers must take into account the gender burden. (M. Khan & Damalas, 2015). The persistence of detrimental cultural values and behaviors has systematically marginalized women, youth, and individuals with disabilities for an extended period. Practices and values such as wife inheritance, early marriages, and gender-based violence have disproportionately affected women. Furthermore, adhering rigidly to cultural norms that obstruct access to food, individuals' rights to possess property or assets, and engagement in food production contributes to food

insecurity in the region (Mujeyi, 2013). Social institutions denote established behaviors characterized by consistent behavioral norms that exist independently of formal systems. They encompass the traditions, practices, and social standards that regulate the complex dynamics of predominantly rural civilizations. Initiatives that disregard the beneficiaries' traditions, values, and social structures are unlikely to succeed. Therefore, it is crucial to evaluate the socio-cultural practices in crop production to align with the traditions and norms of the local population in order to effectively organize and mobilize individuals for social change (Bryan et al., 2013). Van (2020) posits that culture is an attribute of a group, with each person inheriting it from parents, siblings, friends, neighbors, literature, and other sources. Throughout an individual's life, each member continuously sustains, revitalizes, and enhances the community's culture through interactive social processes. Culture emerges via interactive social processes. Culture possesses five fundamental characteristics: it is acquired; it is communal; it is a symbolic framework; it is adaptable; and it is a system composed of diverse elements that, to varying extents, must be integrated to form a relatively coherent lifestyle (Blien, 2015). Any alteration in the natural or social environment results in cultural transformations. Environmental alterations influence adaptation to novel circumstances. Indigenous populations around the world have developed a unique lifestyle that adapts to environments with limited resources. In areas characterized by extreme environmental conditions, such as the Arctic's far northern latitudes or Australia's arid interior, individuals must seasonally disperse and refrain from the intensive exploitation of resources in any single location over prolonged durations (Van, 2020). Advanced agricultural societies with elevated population densities have emerged in well-watered temperate and tropical areas, particularly inside river basins. In

these cultures, the majority of individuals dedicate their entire lives to cultivating a very confined area. In such sedentary circumstances, they must collaborate with their relatives and neighbors. A particular mode of production, which corresponds to specific environmental conditions, adapts family structures, kinship systems, settlement patterns, inheritance practices, architectural styles, land tenure systems, and religious beliefs and rituals. A comprehensive lifestyle integrates them to ensure the community's sustained survival and flourishing. Consequently, culture is essential in resource management. Kinh farmers in the Red River Delta are proficient ecologists in the cultivation of wet rice within the flat and well-irrigated delta ecosystem [Le TrongCuc and Rambo] (Blien, 2015). They possess the expertise to sustain elevated and consistent agricultural output. Few farmers globally can exceed their proficiency in this endeavor. The mountains represent an unfamiliar and foreign landscape for individuals who have established a prosperous wet rice society in the delta. They lack competence in cultivating sloped terrain reliant on precipitation. Consequently, upon migrating to the uplands in significant numbers in recent years, they encountered considerable challenges in adjusting their agricultural practices to the sloped terrain. Ethnic minorities found it impossible to implement shifting cultivation techniques, as this method requires extensive traditional knowledge and integrates with settlement patterns, lifestyles, social institutions, and rituals entirely unfamiliar to the Kinh people (Van, 2020).

The influence of religion and faith in international development cooperation is a contentious topic of discussion. However, this role's validity is frequently attributed to pragmatic considerations. But only looking at faith and religion in terms of their practical

uses misses the chance for a religious basis in development cooperation as a whole, as well as the chance for faith to have an impact through individuals working in secular NGOs and research and policy institutions (Dryden-Peterson & Reddick, 2019). Consequently, the principles of conservation agriculture emerge as a general requirement for sustainable agriculture, encompassing cotton production, or, according to its Christian advocates, the sole method of farming that aligns with divine faithfulness. In this narrative, the socio-economic and agro ecological contexts no longer serve as foundational influences on agronomic practices. Conversely, people view CA as a virtuous expression of faith (Giller et al., 2015). "God neither cultivates the earth nor obliterates the exquisite layer of mulch... Do we assume superiority in agriculture over God? Dryden-Peterson & Reddick, 2019. Adopting contemporary agricultural practices in sustainable cotton growing has encountered difficulties due to varying cultural attitudes. Consumers expect garments produced with high quality and ethical standards, free from detrimental agrochemicals and exploitation (Sumberg et al., 2013).

Culture, religious beliefs, and societal standards mandate that unpaid domestic and reproductive tasks, including water collection, childcare, cooking, and laundry, are the responsibility of female household members. Numerous gender roles characterize the circumstances in rural Africa, as articulated by R. Serra in her latest study (2014). The impact of this household burden on women's economic prospects is detrimental and foreseeable, yet frequently overlooked in initiatives designed to enhance female involvement in crop production. The time constraints imposed by rural women's unpaid domestic labor and the inability of men to substitute for female labor in home tasks restricts

women's options in agricultural production. Household members predominantly undertake time-consuming and physically demanding tasks, such as retrieving essential household items like water and fuel, with minimal assistance from males to females (Pinto et al., 2014).

Global marketing has subjected cotton to numerous marketing and trade interventions. Lau et al. (2015) estimated that in the early 1990s, almost two-thirds of cotton production occurred in nations with governmental intervention, encompassing taxation and subsidy policies. The ICAC (Burhan, 2022), which has been assessing the extent of support for cotton production from major producers since 1997–98, has identified that at least eight countries—Brazil, China, Egypt, Greece, Mexico, Spain, Turkey, and the United States—have continuously provided aid to cotton production. Between 1998 and 2002, the average level of assistance in these eight nations was $5.3 billion (table 4). In 2002, at its peak, assistance to U.S. cotton producers amounted to $3.6 billion, while China provided $1.2 billion and the EU contributed over $1 billion. Producers in Brazil, Egypt, Mexico, and Turkey earned $110 million. In 2002, India provided help to its cotton sector amounting to approximately $0.5 billion (Lau et al., 2015).

Cotton consumption statistics pertain to the mills' utilization of cotton fibers for yarn production. The utilization of this mill is contingent upon worldwide textile demand and competition from alternatives, like polyester and other synthetic fibers. In recent decades, global demand for textile fibers has significantly increased, predominantly satisfied by synthetic fibers. Per capita consumption of non-cotton fibers surpassed that of cotton in the early 1990s and has sustained robust growth (Luitel et al., 2013). In contrast, worldwide per

capita use of cotton fibers has remained relatively stable over time and has even declined in recent years. Consequently, worldwide cotton consumption reached its zenith in 2007 at 27 million tons, then decreased to approximately 26 million tons between 2017 and 2019. Sustainability factors will persist in shaping the future demand and supply of cotton. We anticipate that the Better Cotton Initiative will set sustainability requirements for 19% of global cotton output in 2017-18, with potential for future expansion. We anticipate the expansion of associated sectors, including organic cotton. These trends indicate a heightened demand for transparency and traceability throughout the supply chain (OECD, 2020).

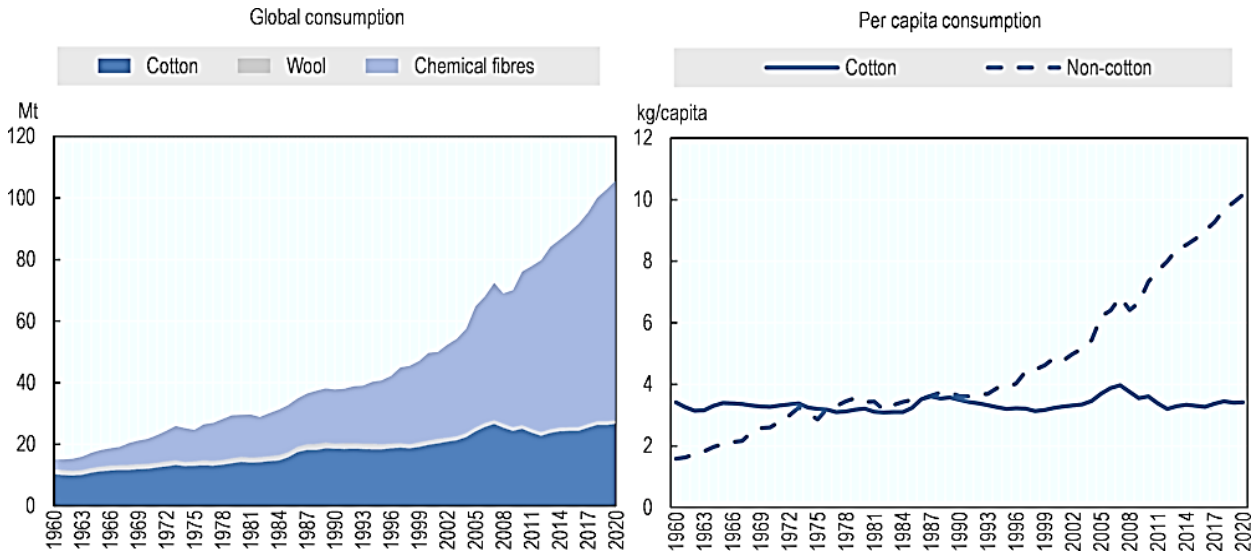


Figure 2.2: Historical trends in consumption of textile fibers (Source: OECD/FAO, 2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

Alongside domestic support, there exist certain border constraints. In 2003, the import tariff rates were as follows: Argentina (7.5%), Brazil (7.5–10%), Egypt (5%), India (10%),

Uzbekistan (10%), along with Zimbabwe (20%) are the others. China (3 percent inside quota, ninety percent beyond quota; TRQ of 856,250 tons in 2003) as well as the USA (4.4 cents/kg inside quota & 31.4 cents/kg beyond quota; TRQ of 73,207 tons within 2002, whereas cotton imports totaled to 6,295 tons) were among the nations enacting tariff rate quotas (TRQ). This section examines the structure and extent of interventions in the United States, European Union, and China. It also examines Uzbekistan, a nation that imposes levies on its cotton industry (Werken, 2015). In the US, the main ways to help are decoupled payments (previously called "production flexibility contracts"), deficiency payments (also called "loan rate payments"), insurance, subsidies for domestic mills (called the "Step-2" mechanism and often thought of as an export subsidy), and emergency payments (created in 1998 to make up for lost income from low commodity prices and made permanent by the 2014 Farm Bill) (Glauber & Westhoff, 2015). The 1996 Farm Bill established direct payments, fixed annual disbursements determined by historical cotton production regions, to offset "losses" resulting from the abolition of deficiency payments. Market price payments, which include loan deficiency payments, marketing loan profits, and forfeitures, reimburse cotton producers for the disparity between the world price and the loan rate (the target price) when the loan rate surpasses the world price. When domestic prices surpass global prices, step-2 payments disburse to qualifying cotton exporters and domestic end users, thereby ensuring the competitiveness of U.S. exporters. Furthermore, the program is highly intricate, involving numerous essential components that interact and counteract to establish pricing, acreage, and payments, as well as to regulate imports. The dire economic circumstances and other incentives that prompted the cotton program in the 1930s are no longer present (Johnson et al., 2013a). In the 1960s and 1970s, Greece and

Spain, the two foremost cotton growers in Europe, each yielded an average of 130,000 tons. Following their EU membership, cotton output grew at an average annual rate of 7.3 percent, surpassing 400,000 tons in the 1990s, and supported cotton growers under the Common Agricultural Policy, based on the difference between the market price and a reference (support) price. The policy affects the extent of aid rendered, thereby impacting the production volume—255,000 tons for Greece and 82,000 tons for Spain. The European Union revised its cotton program in 1999 (European Commission, 2000; Basal et al., 2019). Although the suggested price and the maximum guaranteed quantity remained unchanged, the penalties for exceeding the maximum guaranteed amount increased. The revised policy reduces the subsidy level by 0.6 percent of the guiding price for every 1 percent increase in excess output, up from 0.5 percent before 1999. The penalty intensifies with increased production, establishing a limit on financial expenditures. The maximum guaranteed quantity applies at the national level, not for individual producers, which leads to administrative challenges and resource misallocation in the absence of a clearly defined quota allocation process. Darekar and Reddy (2017) contended that the existing system was ineffective as a surplus-containment mechanism, leading to losses in farm income. From 1996 to 2000, budgetary expenditures on cotton aid fluctuated between €740 million and €903 million, indicating that, on average, EU cotton producers earned more than double the global price of cotton. Even in times of elevated prices, EU cotton producers receive assistance due to the mandated delivery of budgetary allocations. For instance, EU cotton producers obtained about equivalent support in 1995 and 2002, despite cotton prices in 1995 being double those of 2002 (Johnson et al., 2013a). EU cotton producers get subsidies for inputs in addition to production subsidies. These subsidies include public funding for

irrigation, insurance, and the purchase of equipment. The European Commission proposed a reorganization of the cotton industry on September 23, 2003. About €700 million is proposed for two support measures, of which 40% would come from an area payment as well as 60% will come from a single farm payment that is unaffected by decisions made about output today. Only growers who harvested cotton in the three years between 1999 and 2001 will be paid for decoupling. Payments are made by the European Union for a maximum of 340,000 hectares in Greece, 85,000 hectares in Spain, and 360 hectares in Portugal. The claim is proportionately diminished if it exceeds the maximum allocation designated for any country. Cotton cultivators must maintain the land for optimal agricultural utilization in order to qualify for decoupling payments. To obtain area payments, it is necessary to cultivate cotton (M. A. Khan et al., 2020). China is presently the foremost producer, consumer, and holder of cotton. Following the implementation of the inaugural five-year plan in 1953, China entirely nationalized the cotton sector (Wu & Dong, 2019). The central planning practices implemented at that time, akin to those of the Soviet Union, persisted for 35 years. The central government established output objectives and buying quotas. The cooperatives held a monopoly over all operations related to gins. In 1978, the government enhanced cotton production by elevating cotton prices and providing additional fertilizer. A subsequent enhancement occurred in 1980 with the partial dismantling of the communal production system and the allocation of land use rights to individual farmers (Jia et al., 2014). China's stock levels decreased from 3.5 million tons in 1998–99 to 2 million tons in 2001–02. During these two eras, assistance for the cotton sector diminished. Nonetheless, these subsidy techniques and criteria will remain within the confines of WTO regulations (Qiao et al., 2017). Over a million metric tons of cotton are

produced in Uzbekistan, making it the world's second-largest exporter as well as fifth-largest producer of the crop. Most of this cotton is exported. Exports of cotton made up one-third of all goods exports in 1998–1999, and the industry on average contributed 6.4% of the total GDP of the country. State authority governed Uzbekistan's entire cotton industry prior to 1991. Mills in Russia either utilized the majority of cotton or exported it to Eastern European nations through barter agreements. Subsequent to the dissolution of the Soviet Union, Uzbekistan commenced the exportation of its cotton to Western nations in return for foreign cash. Russia exchanged certain cotton through barter trade agreements until 1996 (Ali et al., 2019). Even after 12 years after the trade system was changed, many aspects of marketing and trading in the industry still resemble pre-1991 arrangements. A multitude of organizations engage in cotton after-production operations, chiefly the state ginning company, state trading organizations (STOs) responsible for exports, along with the Ministry of Foreign and Economic Relations, which regulates finance (Apperson, 2014). All aspects of cotton exports are overseen by the three STOs. Their main responsibilities include: • Making agreements with cotton traders; • Organizing shipments; • Receiving payments for exports; • Converting them into local currency; and • Sending UKP back. Despite undertaking additional tasks such as procuring machinery and equipment for the government, the primary function remains the export of cotton. Each business receives a quota for cotton exports, eliminating competition (Dai & Dong, 2016).The third significant organization is the Ministry of Foreign Economic Relations, whose principal role is to oversee cotton export activities, including price determination, buyer selection, and dollar receipt tracking. Various other entities participate in the sector, including the state-owned enterprise responsible for domestic and international cotton

transportation and the body tasked with quality oversight and customs (Voora et al., 2020). Cotton cultivators are subject to significant taxation, directly through the UKP reduced price, which mandates a fixed price from the STOs, and indirectly through the exchange-rate system. A recent study revealed that at an ex-ginnery price of $1.03/kg, the STOs obtain an equivalent of $0.63/kg, predicated on a global price of $1.24/kg. The study (Shuli et al., 2018) concluded that the difference between $1.03 and $0.63/kg is significant. After deducting the marketing fee, the Ministry of Finance receives the remaining amount as an export duty. UKC sets the price for farmers at 126,000 Cym per ton of seed cotton, equivalent to $0.41 per kilogram at an exchange rate of 960 Cym per dollar and a ginning ratio of 32 percent (Johnson et al., 2013b). It is plausible to conclude that the sector remains under stringent government control, notwithstanding the transition of cotton exports from barter to a commercially oriented framework. Furthermore, due to substantial taxation, cultivators only receive one-third of the cotton export price. The last assertion requires qualification, as the currency rate is not established freely and is likely mismatched, alongside input provisions at non-market rates. A comprehensive perspective of the complete fiber-to-clothing value chain is essential for enhancing opportunities in the global market for cotton products (Janzen et al., 2018). The price of cotton can fluctuate significantly due to various variables, including national regulations, stockpiling, and government subsidies for farmers. Price regulation, in conjunction with other variables, engenders an unpredictable market for farmers, rendering cotton a less appealing commodity to cultivate. The stability of cotton markets is significantly impacted by the financial oversight of cotton, a relatively obscure issue. The World Bank employs these markets for risk management and as a profit source during periods of low returns in

traditional stock markets and investments. This leads to considerable price volatility and unpredictability in the cotton prices that farmers can get at any given moment, but it lacks a genuine correlation to physical supply and demand (Mal et al., 2013). The World Bank Group has engaged in cotton-related initiatives in multiple developing nations. In the past, the Bank has mostly been involved in two ways: lending money to help the cotton industry through IBRD loans or IDA credits, which include both investment and technical help; and giving policy advice through economic and sector analyses, which are usually linked to policy changes that lead to quick loan and credit disbursements (Dejung & Cohen, 2018). Numerous interventions exist within the fiber sector. Cotton is the most commonly used natural fiber in textiles, accounting for one-third of the global fiber consumption. The sector faces numerous sustainability challenges, such as reduced agricultural prices due to unfavorable trade conditions, excessive water usage, pesticide application, and forced labor. Cotton farmers are progressively adopting voluntary sustainability guidelines to tackle sustainability challenges. We must acknowledge the significance of nonconventional cotton cultivation. Cotton cultivation emphasizes cost minimization by reducing the intense use of inputs, particularly pesticides (Darekar & Reddy, 2017). They utilize genetically modified (GM) seed technologies alongside organic agricultural methods. On the demand side, there has been resistance to using the former. Environmental campaigners have ardently adopted the former, but consumer support has not been forthcoming. The potential for expansion seems constrained. Genetically modified (GM) cotton, stemming from scientific advancements in the 1990s, possesses the capacity to lower production costs and thereby enhance the profitability of its early adopters. The United States initially utilized Bt cotton in 1996, and the US Environmental Protection Agency approved herbicide-tolerant cotton

in 1998 (Majeed et al., n.d.). For numerous years, people have used Bacillus thuringiensis (Bt), a naturally occurring soil bacterium, as a biological pesticide. The gene for insect poison in cotton plants originates from that bacterium. The plants generate their toxin, eliminating the necessity for the gardener to apply specific pesticides. Herbicide-tolerant cotton is a genetically modified cotton plant designed to withstand herbicides that would typically eliminate both weeds and the cotton itself. As a result, growers can utilize pesticides without eliminating the cotton plant. GM cotton varieties serve as a safeguard against pests, insects, and weeds. Producers incur additional costs for resistant seeds. Should the insect infest the field, the growers' advantages arise from the reduced expenses associated with the absence of pesticide use. The cultivators forfeit their premium if the pest does not infest the cotton field. In 1996, the United States began growing cotton that had undergone genetic modification. Since then, a large number of cotton-producing countries have embraced genetically modified cotton technology, including Argentina, Australia, Indonesia, along with South Africa in the southern hemisphere as well as China, Mexico, and India in the northern hemisphere. Other nations, including Israel, Pakistan, Turkey, Brazil, Zimbabwe, and Zambia, are undergoing approval or trial phases. The European Union, Uzbekistan, and Francophone Africa are primary producers that have neither utilized nor sanctioned GM cotton. The predominant user of GM cotton is the United States, which is believed to have cultivated 71 percent of its cotton acreage using bio-engineered cultivars during the 2002/03 season—an increase over the previous season's 69 percent share. Australia cultivated around 44 percent of its cotton area with genetically modified types in 2001/02, up from 40 percent in 2000/01. China, having used the new technology experimentally in 1996, cultivated nearly 20 million hectares of genetically

modified types, representing more than 20 percent of its cotton acreage. Alongside the imported GM variety, China has cultivated 11 of its own GM cultivars (Pray et al., 2017). Huang et al. (2016) indicate that a substantial portion of the advantages derived from cultivating Bt cotton in China accrued to farmers, predominantly smallholders, due to inadequate property rights. Conversely, the majority of the advantages derived from GM products in the United States accrue to biotechnology and seed corporations. GM cotton contributes approximately 4.2 million tons, or over 20 percent, to global cotton production, with existing customers also serving as substantial producers. Should the transition to genetically modified (GM) types persist at the rates observed in recent years, within less than a decade, up to fifty percent of the global cotton supply may originate from GM sources (Kiresur & Manjunath et al.). Cotton is the most commonly used natural fiber in textiles, accounting for one-third of all global fiber production. The sector encounters multiple sustainability challenges, including diminished agricultural prices, frequently attributable to adverse trade conditions, excessive water usage, pesticide application, and coerced labor. Cotton farmers are progressively adopting voluntary sustainability guidelines to tackle sustainability challenges. Contemporary cotton cultivation trends emphasize cost minimization via reduced input intensity, particularly with chemicals. They utilize genetically modified (GM) seed technologies alongside organic agricultural methods. On the demand side, there has been resistance to using the former. Environmental activists have embraced the former more eagerly than customers have. The potential for expansion seems constrained. Genetically modified (GM) cotton, a product of 1990s scientific advancements, lowers production costs and hence enhances the profitability of its early adopters. There are two types of genetically engineered cotton: tolerant to herbicide cotton,

which was certified by the US Environmental Protection Agency in 1998, along with Bt cotton, which was first brought to the US in 1996. Scientists have used the naturally occurring soil bacteria Bacillus thuringiensis (Bt) as a biological pesticide (Traoré et al., 2014). Since then, several cotton-producing countries have embraced genetically modified cotton technology, including the nation of Argentina, Australia, Indonesia, & South Africa in the southern hemisphere as well as China, India, and Mexico in the northern hemisphere. Other nations, including Israel, Pakistan, Turkey, Brazil, Zimbabwe, and Zambia, are undergoing approval or trial phases. The European Union, Uzbekistan, and Francophone Africa are primary producers that have neither utilized nor sanctioned GM cotton. The predominant user of GM cotton is the United States, which is believed to have cultivated 71 percent of its cotton acreage using bio-engineered cultivars during the 2002/03 season—an increase over the previous season's 69 percent share. Australia cultivated around 44 percent of its cotton acreage with genetically modified types in 2001/02, up from 40 percent in 2000/01. China, having used the new technology experimentally in 1996, cultivated almost 20 million hectares with genetically modified cultivars, which represented more than 20 percent of its cotton acreage (Mal et al., 2013). Developing nations have the potential to capitalize on the organic cotton market niche, given their minimal reliance on pesticides and fertilizers, which enables them to label themselves as "organic" cotton growers without altering their production methods. Its potential, however, seems constrained. Several nations, including those in Africa, have implemented organic cotton efforts; however, their scale remains negligible in comparison to the global output of conventional cotton. According to Myers & Stolton (2019), the global production of certified organic cotton fiber in 1997 was around 8,150 tons, with 2,600 tons coming from the US, 1,175 tons from

India, 1,800 tons from Turkey, 1,570 tons from Africa, and 845 tons from Latin America. The substantial growth of organic cotton encounters challenges in both supply and demand. Cotton has undergone numerous marketing and commercial interventions. Townsend & Guitchounts (1994) estimated that in the early 1990s, over two-thirds of global cotton originated from nations with some form of government intervention. Conversely, cotton-producing countries with minimal or no government intervention included Argentina, Australia, El Salvador, Guatemala, Israel, Nicaragua, Nigeria, Paraguay, Peru, and Venezuela. These measures aimed to ascertain whether taxes or supports/subsidies arise from domestic market activities or through state firms, price supports, and import duties. These efforts produced the following general categories of distortions: The state marketing agency purchases cotton at predetermined, below-market rates to reallocate resources from cotton producers to the government. This type of involvement is prevalent in Central Asia, where the government manages internal marketing and international trade. State-owned corporations in France and domestic entities govern the marketing and commerce of cotton in Francophone Africa. The government typically employs border interventions to impose taxes on cotton producers in order to safeguard the domestic textile industry. Egypt, India, Pakistan, and Turkey have intermittently engaged in such interventions. Cotton producers in the European Union receive subsidies under the Common Agricultural Policy to enhance their income, which can reach twice the global price in some years. U.S. cotton producers received substantial assistance, averaging 25% of the market price throughout the late 1990s. Certain nations, including China, impose import duties on cotton to augment producers' revenue. Alongside output distortions, many input market distortions have impacted the cotton sector, particularly subsidies for finance, fertilizer, and irrigation. The

International Cotton Advisory Committee (2002), conducting an assessment of major producers' assistance to cotton production since 1997/98, found that eight countries supporting cotton production—the US, China, Greece, Spain, Turkey, Brazil, Mexico, and Egypt—had varying levels of direct production assistance during the five seasons from 1997/98 to 2001/02. In 2001/02, direct aid to US cotton producers amounted to $2.3 billion, China's help was $1.2 billion, and the EU (Greece and Spain) provided $0.8 billion (International Cotton Advisory Committee, 2002). Interventions vary throughout various countries. In the United States, initiatives related to cotton have been implemented. The aims of these programs have centered on two themes: increasing and stabilizing agricultural revenue and safeguarding small farms. These policies encompass price and income assistance, trade limitations, including import quotas and tariffs, publicly financed research, irrigation, export subsidies, export credit guarantees, subsidized land set aside and conservation initiatives, and subsidized crop insurance. Every few years, Congress authorizes budgetary outlays for the majority of these programs through various acts, often referred to as Farm Bills, with subsequent presidential approval. Since the initial adoption in 1929, there have been 20 similar acts, including a 1934 Supreme Court ruling that deemed the principal sections of the 1933 Agricultural Adjustment Act illegal (D. Myers & Stolton, 1999). The origins of cotton intervention in the European Union date back to 1981, when Greece and Spain, the two European cotton producers, became part of the Union's Common Agricultural Policy. In the 1960s, Europe had three cotton producers: Greece and Spain, each yielding an average of 85,000 tons, and Bulgaria, which produced 25,000 tons. During the 1970s, Bulgaria's production diminished, ostensibly due to its status as a high-cost producer, while Greece and Spain maintained their cotton output at the levels observed

in the 1960s. The combined cotton production of the three countries underwent an annual decrease of 0.4 percent from 1960 to 1982. Following the EU's initial expansion and the subsequent accession of Greece and Spain, cotton production experienced an average annual increase of 7.3 percent, in contrast to a global growth rate of 2.3 percent during the same timeframe. In the 1990s, Greece and Spain produced an average of 325,000 and 78,000 tons of cotton, respectively (Baffes, 2001). China's involvement in its cotton subsector dates back to 1953, with the implementation of the First Five-Year Plan (Zhong and Fang). At that time, China implemented central planning policies derived from the Soviet Union, which persisted for 35 years. The federal government would establish output targets and buying quotas. The cooperatives that possessed ginning facilities at the commune level held a monopoly on ginning. In 1978, the government enhanced cotton production by raising cotton prices and providing additional fertilizer. In 1980, a further boost came due to the partial deconstruction of the communal production system via the Household Responsibility System, which awarded land use rights to private farmers. Through state stockholding, subsidies for export, tariffs on imports, and assistance in pricing, the Chinese government protects its cotton sector. The benchmark price for cotton is set by the government, which is often higher than the market price. China also imposes import tariffs that reconcile domestic and global pricing. Following its WTO accession agreements, China reduced tariffs to 15 percent and concurrently instituted a tariff-related quota system to regulate imports (Huang et al., 2002). Africa predominantly bears the burden of domestic labor responsibilities. Beyond women's labor, the physical consequences of their roles as producers of goods and services, custodians of family well-being, primary educators of children, and stewards of morals and culture may jeopardize

household health. The gender division of work within households influences members' decisions to accept, reject, or pursue alternatives to the traditional paradigm of agricultural production (Meuwissen et al., 2019). The treaties of the East African Community (EAC) and the Common Market for East and Southern Africa (COMESA) acknowledge women as essential contributors to agriculture, industry, and trade. Women are integral to cotton production and play an even more vital part in the weaving of traditional handmade products within the cotton-lint textile-apparel chain (Apperson, 2014). The most notable aspect of agricultural policies in Africa is their focus on gender issues, namely the insufficient recognition of women's contributions, needs, and potential in policy papers. Women frequently receive only segmented attention in development plans and policy texts. Consequently, it is not unexpected that agricultural development plans have frequently overlooked them. Agricultural and food systems often perpetuate gender prejudice and blindness, perceiving farmers as either gender-neutral or masculine (Komatsu et al., 2019). Women are analogous to farms. Some African traditions impede the advancement of equal rights for women. In many areas, women remain unable to purchase land and can only inherit it indirectly through their husbands. Social Accountability in Sustainable Agriculture (SASA) acknowledges the intricacies of effectively addressing cultural elements that influence gender when evaluating and executing gender-blind or non-discriminatory labor conditions. The SASA stated that the majority of women are required to acquire permission from their spouses to secure employment outside agricultural work. The cultural context in Africa suggests that the certification applicant and its clients must initiate and manage a prolonged process to ensure equal opportunity for women. (Bryceson, 2019) In Chókwè, women's concern is not land access, but rather its utilization, as various

constraints limit their livelihood opportunities. While they may possess a title to their land, this does not adequately safeguard against the threat of landlessness due to insufficient time and financial resources to develop new agricultural skills, diversify crops, and engage in commercialization; the extensive productive and reproductive labor required from women; and the elevated prevalence of HIV and AIDS in the region (Xie & Lu, 2017). In certain regions of Burkina Faso, men and women may cultivate distinct crops. People commonly categorize cash and export crops as "male crops," while subsistence crops are considered "female crops." The prevailing rationale behind this gender-based crop division is that women, responsible for feeding the family, typically cultivate subsistence crops for domestic consumption. We refer to individuals engaged in agriculture as cultivators of cash and export crops because they are responsible for generating monetary income. It is challenging to ascertain whether women cultivate lower-value subsistence crops due to distinct preferences and concerns or restricted access to land, resources, credit, knowledge, or markets (Dai & Dong, 2014c). In Zambia, as farm size expands, women assign a greater proportion of labor to family maintenance and agriculture. Concurrently, men engage in marginally reduced agricultural labor and significantly diminished non-agricultural activities, adversely affecting agriculture, extension services, and the adoption of technology. Nonetheless, religious affiliation, behavioral habits, attitudes, and apathy can influence agricultural practices. The inflexible, socially endorsed gender roles in rural communities significantly limit women's options for distributing their time among crop production and various paid and unpaid productive and domestic tasks, resulting in time poverty (Yen et al., 2013). Culture, religious beliefs, and societal standards mandate that unpaid domestic and reproductive tasks, including water collection, childcare, cooking, and

laundry, are the responsibility of female household members. Uncompensated labor for women characterizes the circumstances in rural Africa, as R. Serra elucidates in her new work (2018). The impact of this household burden on women's economic prospects is detrimental and foreseeable yet frequently overlooked in initiatives designed to enhance female engagement in remunerative jobs. We must consider multiple facets of gender issues. The inflexible regulations around women's time utilization significantly limit their choices. Societal conventions somewhat regulate these choices by classifying certain tasks as exclusively feminine. Policies that offer high-return employment possibilities for women but neglect their overall time constraints may adversely affect women's living conditions (Salmon & Serra, 2017). It is essential to enhance the visibility of home production while considering the issue of elevated rural incomes or economic diversification. Initiatives disregarding the beneficiaries' traditions, values, and social structures are unlikely to succeed. Therefore, it is imperative to address the socio-cultural practices in crop production that align with the traditions and norms of the local populace, facilitating the organization and mobilization of individuals to promote social change (Pinto et al., 2014).

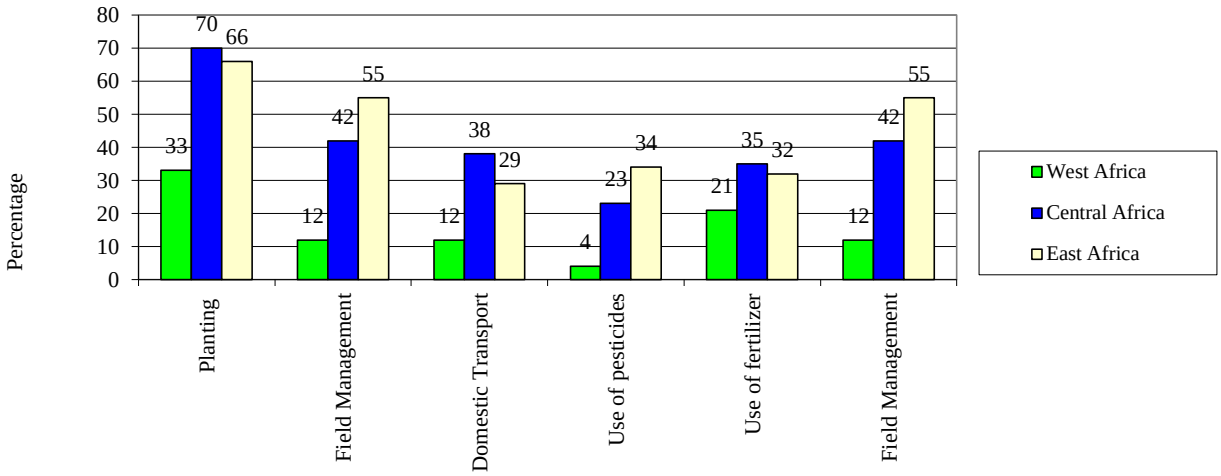


Figure 2.3: Women as a percentage of the total workforce in the cotton sector in West Africa, Central Africa and East Africa Source: Women in cotton results of a global survey (Dai & Dong, 2014a)

The cotton sector in Zimbabwe is a success narrative that integrated formerly marginalized black individuals into the state-organized single marketing system post-1980. Owing in part to the proliferation of the single-channel marketing system in rural regions, the count of registered cotton cultivators exceeded 150,000 in 1986, signifying a fourfold augmentation since 1980. During the 1985/86 marketing season, the Cotton Marketing Board (CMB) produced around 250,000 tons of seed cotton, predominantly sourced from community areas. Prior to early 1992, the Cotton Marketing Board (CMB) managed and orchestrated the entire process, from the initial procurement and delivery of inputs at the farm gate to the sale of lint (Tausif et al., 2018). In 1967, during the initial phase of Rhodesia's Unilateral Declaration of Independence from Great Britain, Zimbabwe's Cotton Marketing Board (CMB) came into existence. By acquiring seed cotton and exporting lint, the Board exerted monopolistic power, paying fixed rates established through negotiations between the

government and the Rhodesia National Farmers Union later renamed the Commercial Farmers Union. In contrast to numerous regional parastatals, corruption has not been a significant issue within the CMB (Venkatachalam et al., 2013). The evaluation of agricultural prices emphasized rigorous grading, with smallholders in southern and eastern Africa attaining the highest average prices (Meuwissen et al., 2019). A sustained commitment to varietal research persisted, and financing was extensively accessible via the Agricultural Finance Corporation. As a result, the region saw the highest levels of smallholder productivity, with average yields of over 700 kg/ha. Zimbabwe maintained meticulous quality control that secured a favorable market and a price premium of around 10% in global markets. Nonetheless, this notable achievement incurred significant budget deficits due to a policy of subsidized lint sales to local spinners (Larsen, 2002a) and the considerably elevated expenses associated with servicing numerous dispersed smallholder farmers. Given the present conditions, it is improbable that the industry would sustain its exemplary support for farmers, elevated smallholder production, robust credit repayment, and superior lint exports (Luitel et al., 2013). German colonizers introduced cotton as an agricultural product to Tanzania in 1904. Tanzania produced 80,000 tons of cotton in 1966, accounting for 0.75 percent of the world's total. Ginneries In Tanzania before 1994, primary cooperative societies (PCSs) primarily supervised the sale of seed cotton from farmers, whilst regional cooperative unions (RCUs) oversaw ginning activities. Significant financial difficulties have beset the Tanzanian system, at least since the beginning of the 1970s. Due to overstaffing, poor management, and insufficient credit recovery, the Cotton Board often had trouble paying the RCUs for the crop on time because of financial concerns. As a result, they were unable to provide the PCSs operational funds and inputs. Inflation eroded

the one-to-two-year payment delays that producers faced. A significant quantity of cotton remained unharvested or unginned. Gibbon indicates that seed cotton production decreased from an average of over 200,000 metric tons from 1971–75 to approximately 130,000 metric tons in the 1980s, while the debt of the Cotton Board and RCUs surged (J. Kabissa et al., 2022). In Francophone Africa, the six principal cotton-producing nations (Burkina Faso, Mali, Benin, Ivory Coast, Chad, and Cameroon) cultivated cotton under the aegis of the French Administration and the public enterprise Compagnie Française de Développement des Fibres Textiles (CFDT). The French cotton policy arose from the alignment of interests of the colonial administration, manufacturers, and the metropolitan government, as the textile sector was a significant source of employment in the Metropole (Soumaré et al., 2021). In the early part of the 20th century, the French cotton policy relied on two primary constraints: promoting production expansion. Secondly, the regional textile sector in WCA generated intense competition for the procurement of raw cotton. The global economic landscape, as well as the condition of the American cotton industry, influenced cotton policy in Francophone Africa. Instances of coercion encompass the requirement to cultivate in supervised communal areas, referred to as the "Commander's fields," and the restriction preventing locals from purchasing and processing cotton (Venkatachalam et al., 2013). The IRTC stands for the Institut de recherché sur le coton et les fabrics exotiques. The establishment of the IRTC in 1946 aimed to cultivate novel seed kinds. In 1949, the French Company for the Development of Textile Fibers (CFDT) emerged, formerly known as the Textile Company of the French Union (Compagnie des textiles de l'union française, CTUF). The CFDT aimed to enhance cotton output by implementing novel varieties created by the IRTC, spreading related skills, and establishing ginning operations in regions

without private ginners (Darekar & Reddy, 2017). Mali is likely the location of the intermediate documents. Theriault (2013) observes that Mali is the sole other francophone nation undertaking significant reforms in the cotton sector after the near insolvency of its national cotton enterprise a few years prior. Initiatives are in progress to permit new ginning operators to establish facilities in two production zones. Furthermore, negotiations are underway to reorganize the National Cotton Corporation, potentially leading to its privatization in the near future. Women are integral to cotton production and significantly contribute to the weaving of traditional handmade products within the Kenyan cotton-lint textile-apparel sector. Documenting women's contributions in this area is crucial. Significant evidence indicates that gender-based limitations hinder the productivity of female smallholder farmers in Kenya. Women are the predominant segment of the active agricultural workforce. Socio-cultural traditions, which grant substantial decision-making authority to their elders, deny young males access to land, thereby inhibiting the allocation of land to young men while their fathers are still alive. Gender norms and the variables influencing their evolution differ significantly across the nation and necessitate thorough examination (Clarence-Smith, 2014). According to a 2009 study under NALEP, the assets of women farmers typically have limited potential to generate income. The items encompass chickens, dairy goats, firewood, charcoal, and funds allocated through local credit institutions, such as "merry go-rounds" and kitchen utensils. Men's assets typically possess significant value and are directly associated with production, encompassing land, production tools, finance, education, and agricultural technologies. The disparities between women and men in asset access and control lead to considerable productivity differences. Despite their contributions, women in male-headed households often have limited control

over benefits, which can lead to reduced participation in subsequent seasons, ultimately compromising overall production and productivity (Were, 2016). Potential gender roles in rural socio-economic development often restrict access to loans, agricultural inputs, and time, mostly because of the significant influence of patrilineal land inheritance systems and related decision-making authority. In some Kenyan communities, women lack both land to use as collateral for credit and the autonomy to independently make such requests. The study in Kisumu County indicates that demand factors constrain women's access to credit, as rural women infrequently ask for loans due to internalized cultural norms and supply issues because they rarely possess land to serve as collateral. Furthermore, when credit or purchases occur, payment is executed, typically by the male head of the household or stakeholders, alongside their respective functions, roles, and relationships, as well as the establishment of value chain governance or leadership to enhance chain formation and identify value chain activities. Cooperatives serve as an efficient mechanism for farmers to market their cotton, enabling them to realize economies of scale. They support members in many capacities: enhancing the income of producers through seasonal pricing for commodities such as cotton, therefore mitigating the risks associated with the time of sales, and alleviating marketers from the obligation of doing their trade research. In response to the demands of textile mills, cooperatives ought to standardize the varieties of cotton cultivated in their region (Were, 2016).

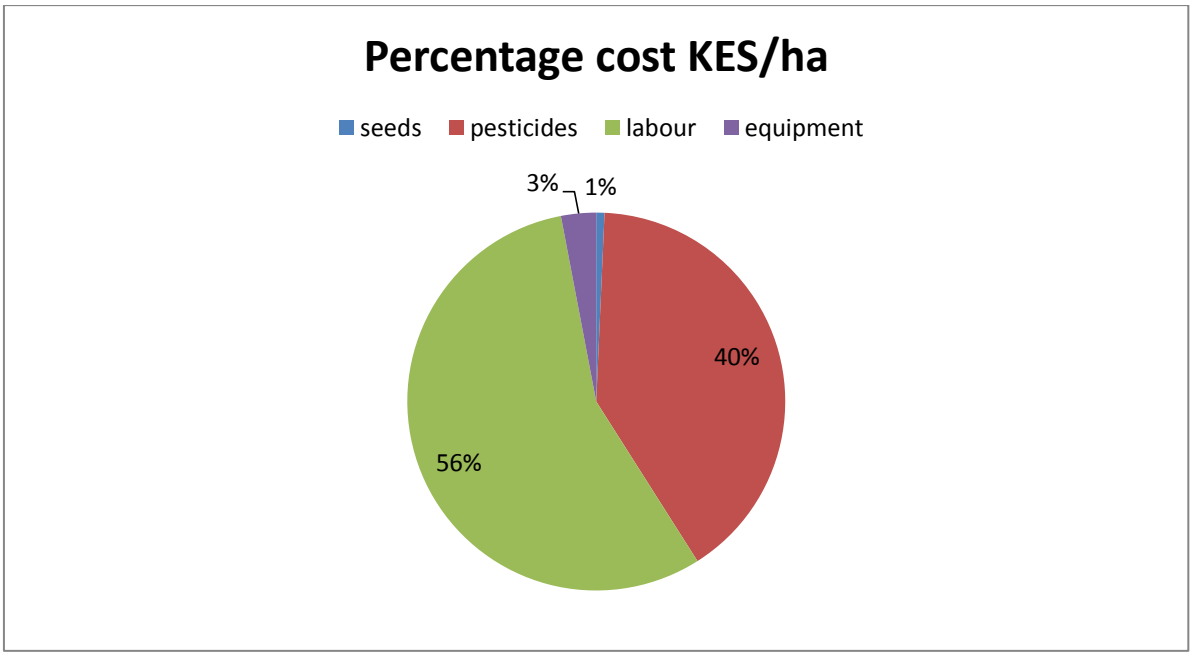


Figure 2.4 Cost distributions for various activities in producing one hectare of cotton (Source: Modified Data from cotton production, constraints, and research interventions in Kenya, 2016).

The figure above illustrates the percentage cost of several socioeconomic factors influencing the sustainability of cotton production in Kisumu County. Sustainable cotton production significantly enhances the region's social aspects and development. Figure 1.2 illustrates a significant concentration of costs in labor. Increasing cotton production requires more labor, which in turn leads to an increase in employment. A stable income within a society fosters enhanced living standards, better health, increased productivity, and overall societal advancement (Peltzer & Brüntrup, 2023). Diiro, Seymour, Kassie, Muricho, & Muriithi (2018) state that the Kisumu County study indicates a favorable association involving cotton production in western Kenya as well as the empowerment of women in

agriculture, as measured using indicators from the shortened empowerment of women in Agriculture Index. Using a dataset of 707 maize farm families in western Kenya using a cross-sectional instrumental-variable regression technique, it is possible to determine that women's empowerment in agriculture significantly increases cotton production. While all factors of women's empowerment substantially enhance productivity, a notable correlation exists between women's workload (time dedicated to work) and cotton productivity (Wallin, 2023). The results indicate varied effects of women's empowerment on cotton productivity for plots managed jointly by males and females and for plots managed separately by either males or females. The findings indicate that both female- and male-managed plots exhibit notable productivity enhancements when the women overseeing them are empowered. These data demonstrate that women's empowerment not only narrows the gender gap in agricultural productivity but also enhances productivity on farms operated by women. Consequently, rural development initiatives in Kenya focused on augmenting agricultural productivity—and thereby improving food security and alleviating poverty—could realize a more substantial effect by including women's empowerment in current and prospective programs (Vincent, 2022a). Romero-Paris elucidates the significance of agriculture, cotton cultivation, and women's roles in cotton-centric agricultural practices. It also addresses substantial dangers to cotton-based agriculture and the repercussions on impoverished rural women, including natural catastrophes, climate change, and escalating male outmigration. It also provides examples of technologies that can give women farmers an advantage. Ultimately, it proposes ways to meet the needs of women in research, technology development, and extension. Nyakwara, Mokua, Moturi, and Gethi (2015) assert that the oil crop industry is recognized as a pivotal avenue for achieving food

security and a mechanism for poverty alleviation by the Kenyan government. Consequently, numerous studies and development initiatives focused on advancing soybean and sunflower cultivation in Kenya have been conducted since the 1990s. Although numerous studies have focused on the low adoption of these crops, issues such as gender roles and access to and control of property remain unexamined. This study examined gender roles and their potential environmental impacts during oil crop production by smallholder farmers in Lare Division, Nakuru County, and Kisumu County, Kenya (Rutto et al., 2022). The analysis focused on gender roles, gender-specific access to information, and awareness of environmental and gender regulations. Purposive sampling was employed to acquire a sample size of 180 smallholder farmers from 330 households in the study area. The results suggested that the activities and production of oil crops were gender-specific. Male farmers possessed land and obtained information via training, although they were not engaged in all aspects of soybean and sunflower cultivation. Gender roles conform to traditional and cultural norms about pesticide application; male farmers performed it without protective equipment despite training in safe techniques. Regarding awareness of environmental and gender regulations, 58% of female and 13% of male farmers were uninformed. The study concludes that sunflower and soybean are female enterprise crops. Male farmers owned the land and hence dictated all labor requirements, irrespective of gender (Vincent, 2022a). All male farmers obtained information on optimal farming practices; however, female farmers (n = 93) did not. Awareness of policies was limited, as 52% of female and 13% of male farmers were uninformed. This lack of comprehension will likely result in suboptimal agricultural practices that may exacerbate environmental problems. The study advocates for promoting policies, initiatives, and projects that enhance

equitable access to and control over productive resources, inputs, and services for both men and women at the grassroots level. It is essential to examine the alterations in gender roles within agriculture to comprehend the cultural framework in various regions. Comprehending these shifts significantly improves project planning and implementation. Patil and Babus (2018) note that gender studies primarily aim to investigate gender disparities in development issues and strive to equalize the advantages of development. The burdens of gender in agricultural tasks have raised concerns over the equitable distribution of technological gains among individuals. This study aims to acquire and analyze gender-specific labor experiences in crop production through a sample survey of two hundred farmers evenly divided by gender. The survey was executed in five adopted villages of Chevella Mandal, Andhra Pradesh, from 2007 to 08. The study indicated that men and women prioritized drudgery in agriculture operations differently. The primary elements influencing the established priorities include time and posture demands for males and time, posture, exertion, perceived difficulty, and workload for women. The results assist in selecting appropriate technology that can mitigate the elements of toil. Cultural beliefs are a fundamental element. Culture is the possession of a community; each individual within the group inherits Culture from parents, siblings, friends, neighbors, literature, and other sources. Throughout an individual's life, each member continuously sustains, revitalizes, and enhances the community's culture through interactive social processes (Blien, 2015). Culture emerges from these interacting social processes. Five fundamental characteristics commonly identify culture: learned, shared, symbolic, adaptable, and composed of interrelated components that collectively form a coherent way of life. Any alteration in the natural or social environment results in cultural transformations. Modifications are

implemented to accommodate the new circumstances. Indigenous peoples have cultivated a distinct lifestyle tailored to an environment with limited resources. In these cultures, most individuals dedicate their entire lives to cultivating a very confined area. In such sedentary circumstances, they must collaborate with their relatives and neighbors. Family structures, kinship systems, settlement patterns, inheritance practices, architectural styles, land tenure systems, and religious beliefs and rituals are all adapted to a particular mode of production corresponding to specific environmental conditions. They are an integral aspect of a comprehensive lifestyle aimed at ensuring the enduring survival and flourishing of the community. Consequently, culture is essential in resource management (Pinto et al., 2014). Religion significantly influences societal behavior. A correlation exists between rainfall risk and affiliation with religious communities, particularly pronounced in agricultural areas and those facing heightened rainfall risk during the growing season. Consequently, the principles of conservation agriculture emerge as a universal requirement for sustainable agriculture or, according to its Christian advocates, the sole method of farming that aligns with divine faithfulness. In such a narrative, the socio-economic and agroecological contexts no longer serve as foundational influences on agronomic practice. Practicing conservation agriculture is, therefore, a virtuous act of faith (Giller et al., 2015). There is an economic necessity for an accessible market. In 2000, a preferential trade deal was established with the United States under the African Growth and Opportunity Act (AGOA). The government abolished all tariffs and quotas on Kenyan textile exports to the U.S.. Consequently, Kenya's textile exports to the United States have markedly risen over the last ten years, reaching a zenith of 300 million USD in 2004 (U.S. DoC & ITC, 2012). The AGOA effort has imposed export restrictions of 1.5–3.5% on the US clothing market. As of

December 2001, the sub-Saharan countries designated under AGOA had contributed less than 20% of the export quota. The availability of AGOA investment opportunities in Sub-Saharan Africa is a significant prospect for manufacturing garments for export to the United States under AGOA. The textile sector is presently functioning at 30-40% capacity utilization, and to rejuvenate it, high-quality, high-yield cotton types must be supplied to cotton farmers. Stakeholders must preserve the genetic integrity of introduced, promising, and existing commercial cultivars. This will guarantee the preservation of all kinds and cultivars over time. Ministry of Industrialization, Report, 2013. Academics have not been neglected. Researchers at Kirinyaga University revitalized the struggling cotton sector with a portable cotton gin designed by the university's faculty. The government-funded project aimed to address the challenges encountered by farmers by equipping them with the capability to process their cotton on-site and establish their pricing (Wilson Odhiambo reports, 21 March 2024). The Kwale Cotton Project, specifically for Kwale, was initiated in 2014 by the NGO Business for Development Project. The project aimed to induce a paradigm shift in farmers' perspectives regarding yield-focused agricultural practices. KALRO (Kenya Agricultural and Livestock Research Organization) Kibos established the nation's inaugural certified cotton seed system to promote the commercial cultivation of this cash crop. The government provided a minimum of 17 tons of Bt cotton seeds to farmers in Busia County, implemented as a pilot initiative to improve the cotton value chains nationwide (KARI, August 24, 2023). In Kisumu County, the gender issue is intricate, characterized by a complex division of labor in which women operate in several realms, largely segregated from men. The dual responsibilities of production and reproduction limit women's time for agricultural activity. The limited acreage dedicated to cotton results in

diminished yields. This separation facilitates the emergence of a distinct women's subculture. In a woman's subculture, distinct group activities, hierarchical structures, and support networks function. This system of sexual segregation imposes numerous limitations on women's access, utilization, and advantages in agriculture (Clarence-Smith, 2014). The gender division of work within households influences members' decisions regarding the acceptance, rejection, or pursuit of alternatives to the traditional paradigm of agricultural production. The inhabitants of Kisumu County in cotton-producing regions have a negative disposition towards using genetically modified crops and certain pesticides in agriculture. They associate it with obstructing the natural order. Cultural practices, including wife inheritance and the lack of rights for women, also influence sustainable cotton cultivation in Kisumu County. The farmers' failure to implement particular cotton cultivation practices negatively impacts sustainable cotton production. Furthermore, the likelihood of moral hazard diminishes by 17% when farmers see traditional culture as a significant constraint on pesticide usage (CODA, 2014). The importance of labor and market dynamics is critical in cotton production. McCall (2013) asserts that the analysis of agricultural growth potential at the village level often overlooks the significance of relative position, in contrast to the emphasis placed on physical resources and economic variables. The relative position of fields and residential locations is not necessarily a critical element compared to pricing policy, government initiatives, or climate variability; nonetheless, distance influences cropping decisions, livestock integration, and input intensity. A key factor influencing agricultural spatial patterns is the physical exertion required to commute to work.' Consequently, temporal factors, distance, and resource limitations influence any locational decision within an agricultural system. These variables include the following: the distance

between the homestead alongside different fields and markets; the modes of transportation to the fields and markets; the duration of inputs of labor as well as seasonal peaks in cultivation; the amount and duration of inputs; the degree of crop protection necessary; the quantity and timing of gathered crops; and the synergistic effects of crop-livestock or agroforestry combinations (McCall, 2013). The influence of faith and religion on growth in Kisumu County is intricate, as each congregation possesses distinct beliefs and doctrines. Nonetheless, practical factors are usually cited as the reason for this role's legitimacy. But to see faith and religion just as tools ignores the possibility that development cooperation might have a religious basis, as well as the possible effect of faith on specific practitioners employed by secular policy, research, as well as non-governmental organizations. Religion has played a crucial part in the agricultural growth of Kisumu County, Kenya. Ager and Ciccone (2015) based their work on the premise that individuals within religious communities provide mutual insurance against certain idiosyncratic risks. A substantial proportion of the populations in Kisumu County, particularly in the cotton-producing regions, is structured into religious groups with diverse beliefs and ideologies (Marshall, 2014). "God neither cultivates the land nor disrupts the exquisite layer of mulch... Do we assume we possess superior agricultural skills compared to God?"" (Dryden, 2018). The implementation of current agricultural techniques has been a barrier to sustainable cotton growing in Kisumu County, attributable to varying beliefs that hinder the adoption of contemporary cotton cultivation practices. According to Anderson & Giller (2013), "Consumers desire their garments to be produced with quality and ethical considerations, free from detrimental agrochemicals and exploitation." Religious beliefs and societal norms dictate that unpaid domestic and reproductive tasks, including water collection, childcare,

cooking, and laundry, are primarily the responsibility of female household members. This accurately describes the circumstances in rural Kisumu County. Moreover, the correlation between rainfall risk and affiliation with religious institutions is more significant in predominantly agricultural counties and those facing heightened rainfall risk throughout the growing season (Bryan et al., 2013). The term 'market' derives from the Latin word 'mercatus,' signifying merchandise, trade, or a location where commerce occurs. The Little Oxford Dictionary, 1969, defines a market as an assembly for the selling of goods, a structure utilized for this purpose, or provisions for commerce. The term "market" can refer to (a) a location or structure where goods are exchanged, such as a supermarket; (b) the prospective buyers and sellers of a commodity, exemplified by the wheat market and cotton market (Gitonga et al., n.d.). Definitions of market include: Firstly, a market is the domain in which price-determining forces function. Secondly, a market is a domain where the dynamics of demand and supply intersect to determine a singular price. Thirdly, the term market refers not to a specific location for transactions but to the entirety of a territory where buyers and sellers engage in unrestricted interactions, resulting in a tendency for the prices of identical commodities to equalize swiftly and effortlessly. Fourthly, a market is a social institution that facilitates the exchange of commodities between buyers and sellers. Fifthly, from an economic perspective, the term market denotes not a physical location but rather a commodity or commodities along with the buyers and sellers engaged in unrestricted exchange with one another (Kamolov & Popineau, 2022). Grönroos, C. asserts that the past 25 years have seen a transformation in the definition of a market as a phenomenon; yet, discussions regarding a market should primarily focus on exchange. Grönroos notes that traditional marketing remains predominant in the marketing paradigm

(Ferro, 2019). However, the trade involving providers and client interactions must be fundamental in delineating a market. A definition of marketing should encapsulate the transformations that the marketing phenomenon has experienced. It should be designed to enhance the role of marketing within the firm by accurately representing reality. Marketing should be aligned with strategy rather than primarily focusing on tactical matters. The marketing concept defines marketing as a collection of human actions aimed at facilitating and completing exchanges. The marketing concept is a customer-centric approach supported by integrated marketing strategies designed to achieve customer happiness. Consequently, it supersedes the sales concept (Prinsloo, 2019). The distance from buying centers refers to the spatial separation between the farmer's production areas and the purchasing locations. Farmers require adequate inputs, including fertilizers, seeds, pesticides, and other resources, to guarantee optimal yield. Similarly, the methods of conveying the final bulk product to the purchasing centers are included. It also examines the infrastructure, storage facilities, and communication between purchasers and vendors. McCall (2013) notes that the assessment of agricultural development potential at the village level often overlooks the significance of relative position, in contrast to the emphasis placed on physical resources and economic variables. The paper contends that, in African peasant agriculture, distance becomes increasingly significant when farming populations are resettled and consolidated, with minimal intensification observed. The effects of agglomeration and excessive commuting are recognized as influencing both the number and quality of agricultural labor inputs, the procurement of home essentials (particularly fuelwood), livestock management, and socio-cultural and welfare circumstances. Basic analyses of time-distance relationships, including the 'effective working day,' are outlined,

and a model of peasant decision-making aimed at maximizing farm activity location is suggested as a descriptive-explanatory instrument. The response to distance-related issues is regarded as an aspect of rural transformation, with an emphasis on the specific circumstances of peasant women concerning distance and transportation technology. The framework of fast rural assessment delineates data gathering procedures and descriptive statements regarding the spatial relationships within a village or agro ecological zone. Ultimately, several potential remedies to the agro-economic distance issue are succinctly examined, including inadequate infrastructure and substandard storage facilities within agricultural systems, as well as the redistribution of the labor force, extension services, and insufficient communication. The most major prospective changes are intensification and satellite settlements, but both encounter challenges in policy and execution (Otieno et al., 2021). The government has implemented many interventions in Kisumu County to promote sustainable cotton cultivation. High-quality seed is a crucial factor. Currently, the majority of cotton-producing nations possess their own commercial varieties, which are derived either from indigenous or ancient stocks or from exotic types imported, mainly from the United States. The commercially farmed cotton types in Kenya are selections derived from evaluating diverse materials introduced from multiple nations. Previous trials conducted in the Lake Cotton Area indicated that four types exhibited optimal growth: Egyptian Abassi, Mitafifi, American Upland, and Bukedi, the last named after Uganda's Bukedi district. Nonetheless, Bukedi demonstrated to be the most appropriate type for the region. Recent modifications have occurred in the early commercial varieties introduced to Kenya, with UKA 59/240, sourced from research breeding stations in Tanzania and Uganda, performing effectively in four provinces: Nyanza, Coast, Central, and Eastern. This variety exhibits

great production potential and resistance to bacterial blight and Jassids. As a result, the BPA variety has been introduced as a replacement for BP52 from Uganda due to its resistance to bacterial blight. Its lint surpasses that of UKA and is appropriate for producing high-quality fabric (Verheyen et al., n.d.-b). The imperative for significant alterations in varieties to align with the ecological parameters associated with rainfall consistency and the evolving requirements of the cotton industry in the Lake Victoria Basin necessitates an extensive selection of novel breeding materials. Exotic materials are significant because they offer optimal plant physiological and morphological traits, growth patterns, and crop quality, which attract breeders. Farmers require high-quality, certified seeds delivered punctually. Currently, there is a significant issue in obtaining uncontaminated seeds for planting. Farmers expressed grievances with the tardiness of seed deliveries, as postponed planting significantly diminishes yield. The director of KARI, responsible for cotton research, stated that the institute is partnering with the Cotton Board of Kenya and KEPHIS to develop this system. Stakeholders ought to investigate regional entities like the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), located in Uganda, which had an established protocol. The nation should strive for an efficient, economical, private-sector-driven seed multiplication, certification, and distribution system (MOA, Annual Report, 2018). The certified cotton seed production and multiplication program is now being implemented by CODA (AFFA) in partnership with the Kenya Agricultural and Livestock Research Institute (KALRO), Kenya Seed Company (KSC), National Irrigation Board (NIB), and the Kenya Plant Health and Inspectorate Services (KEPHIS). KARI, currently known as KALRO (Kenya Agricultural and Livestock Research Organization), is evaluating superior strains for enhanced

resistance to pests and diseases, increased yields, greater lint quality, and adaptability. Numerous trials with superior attributes of cotton may supplant the traditional KSA 81M in the western Rift Region and HART 89M in the eastern Rift Region. BT cotton seed was created using modern biotechnology and evaluated by KARI in controlled fields at Mwea. Data provided demonstrate that BT cotton technology was successful, safe, and had the potential to help cotton farmers. The implementation of the biosafety law, along with the publication of the rules, will (Otieno et al., 2021). The government has expressed worry regarding the accessibility and price of agricultural inputs in Kisumu's cotton sector. The cooperative societies were essential in acquiring and distributing inputs like fertilizers, herbicides, insecticides, and spraying equipment to cotton cultivators. Approximately five cooperative organizations exist in the cotton-producing regions of Kisumu County. Numerous cooperative societies were poorly administered and failed to deliver the requisite services sought by the cultivators. Certain ginners provided cotton growers with cotton seeds and pesticides to recoup expenses on the growers' deliveries. Private vendors marketed the majority of pesticides and other inputs via local market outlets at Ksh 1,500, about double the recommended price of Ksh 680. The government imported agricultural inputs into Kenya exempt from duties and other fees. The elevated expense stemmed from substantial taxation imposed by brokers and third parties, not within the supply chain but in the procurement and distribution of fertilizers. The majority of cooperatives failed, resulting in the loss of farmers' investments and shares, and this painful recollection hinders the resurgence of the cotton industry. Pesticides accounted for 29% of the entire cost of cotton production, rendering them a substantial cost driver in this process. The presence of counterfeit expired or subpar pesticides in the market has resulted in grievances regarding

the effectiveness of pesticides in pest control. Most farmers exhibited insufficient technical understanding regarding pesticide application, which may have contributed to the failures (CODA Kisumu Report, 2014). In the Nyando sub-county, reports from the sub-county agriculture office indicate that of the 8,730 hectares suitable for cotton cultivation, a target of 400 hectares was set, yet only 100 hectares were achieved in 2008. CODA provided merely 5.38 tons of seed cotton, falling short of the anticipated 33 tons, resulting in a production yield of 50 MT of seed cotton. In the extended rainy season of 2015, CODA provided Nyando farmers with 10 tons of organic cotton seed, benefiting portions of the Miwani and Muhoroni sub-counties (Mangieri, 2019a). The research determined that the KIMIRA farmers' cooperative group acquired 5 tons of KSA 81 M cotton in 2015. Ultimately, only 3 tons were sown due to the delayed receipt of seeds for the planting season. Nonetheless, there is a notable enhancement in productivity as producers are gradually adopting a more favorable attitude towards the crop. KIMIRA encounters challenges such as delayed cotton seed supply, tardy planting, erratic weather conditions, insufficient funding for agricultural inputs, lack of education, and pricing issues (including payment methods). Conversely, the Nyando Cotton Farmers' Cooperative Society acquired 231 bags of seed cotton, each weighing 6 kilograms, and subsequently planted 151 bags. The Nyando civilization encounters challenges such as delayed seed delivery, flood impacts, elevated production costs, insufficient capital, erratic weather patterns, and the absence of disaster management systems. In July 2015, the Kano-Kajulu Farmers' Cooperative Society Ltd. established the KOBURA Multi-purpose Rice Farmers' Cooperative Society. The inception of the KOBURA multipurpose was accompanied by excessive rainfall, resulting in subpar cotton yields, although rice thrived remarkably. The

given seed variety was KSA 81M. In the Nyakach sub-county, the Nyakach Farmers' Cooperative Society once had 500 members but today has approximately 200, two-thirds of whom are male. In 2015, Kisumu East had 102 farmers prepared to cultivate cotton (CODA, 2017). The interactions among the cotton value chain participants determine the efficacy of the cotton value chain. The link between farmers and ginners in this context. Consequently, the government has implemented interventions. The Cotton Development Authority (CODA) study indicates that more than 70% of the seed cotton was sold directly to ginneries, while private dealers (intermediaries/brokers) accounted for the remaining 30%. The exercise was corroborated by additional research conducted in the region by CREAM (KIPPRA, 2014). Ginners dominated the farmer-ginner segment of the supply chain and, in numerous instances, dictated the prices remunerated to the farmers. The price paid by ginners ranged from Ksh. 15 to 23 per kilogram of seed cotton, contingent upon specific ginneries and purchasing zones. Conversely, growers express skepticism over the establishment of fixed purchasing schedules, which would have been more advantageous for the farmers. Ginners contend that when they establish purchasing schedules, intermediaries provide elevated prices beforehand to the ginners and procure all the cotton, despite the farmers' indebtedness to the ginners for the credit extended to them. The interaction between ginners and farmers is predominantly informal. Several established formal partnerships encompass agreements for the provision of pesticides on credit, distribution of seeds, and plowing services compensated through future supplies. Kitui and Kibo's ginneries attempted to establish formal contractual agreements with individual growers for the provision of services to farmers; however, the relationship deteriorated due to pervasive apprehension among the ginneries regarding defaults on repayments,

exacerbated by middlemen and rival ginneries purchasing from contracted farmers, thus undermining the agreed-upon recovery framework (Ikiara and Ndirangu, 2016).

2.2.1 Research on Cotton Cultivation

Research has been conducted on social and cultural issues within the cotton farming sector. These encompass gender issues, religious matters, cultural attitudes, economic concerns, and interventions. Peterman, Quisumbing, Behrman, and Nkonya (2015) examined gender disparities in agricultural productivity utilizing data gathered in 2005 from Nigeria and in 2003 from Uganda. Findings demonstrate that diminished productivity is consistently observed in female-owned plots and female-headed families after controlling for diverse socioeconomic factors, agricultural inputs, and crop selections with multivariate Tobit models. These results remain strong after accounting for unobservable household-level factors. Productivity disparities are contingent upon the gender indicator employed, crop-specific samples, agroecological area, and the incorporation of biophysical variables. Enhanced gender data collection and analysis in agricultural research across various locations is advocated to discover treatments that can augment production and program efficacy for both male and female farmers (Baffes & Maratou-Kolias, 2013). Udri (1995) contends that nearly all household models imply that the equilibrium distribution of resources is Pareto efficient. In numerous African households, agricultural production occurs concurrently on multiple plots managed by various household members. Pareto efficiency indicates that variable components must be apportioned optimally among these plots. This study evaluates the weak impact of household models utilizing a comprehensive agricultural panel dataset from Burkina Faso. Plots managed by women have markedly

lower yields compared to analogous plots within the home cultivated with the same crop in the same year but overseen by men. The yield gap is due to markedly more labor and fertilizer inputs per acre in plots managed by men. These findings challenge the Pareto efficiency of resource distribution within the household. Estimates of the production function suggest that approximately six percent of output is misallocated to variable components among plots within the household. The research finishes with recommendations for a novel model of intra-household allocations that align with the empirical findings (Adhikari et al., 2015). Hill and Vigneri (2013) examined the influence of gender-specific limitations on the cultivation and commercialization of income crops. The study observes that cash crop production varies from general agricultural production in that it involves participation in output markets for sales purposes. The sale necessitates dependable consequences for the requisite scale and quality of production. Evaluating the role of women in cash crop production is crucial since it contrasts with the cultivation of other crops and offers substantial possibilities for enhancing the welfare of rural households. This research emphasizes, through a synthesis of literature review and original data analysis, that women are as productive as men and obtain equivalent prices when utilizing the same resources and selling their harvests in an identical manner. Our review and analysis indicate that women infrequently possess equivalent access to assets and markets as men, which significantly affects the development and sale of cash crops. The disparities in resources based on gender lead to varying degrees of engagement, production techniques, and marketing strategies for cash crops, ultimately affecting women's potential success in cultivating these high-value commodities (Azam et al., 2013). The study by Tiruneh, Tesfaye, Mwangi, and Verkuijl (2021) offers definitive insights into the influence

of gender on resource ownership and decision-making within the mixed farming systems of Ada, Lume, and Gimbichuworedas in the central highlands of Ethiopia. A multistage purposive sampling technique was employed to pick homes led by males and females, considering factors such as population, cultivated crops, altitude, and proximity to the study center. In a sample of 180 households, 81 (45%) were led by women. Male-headed homes (MHHs) were, on average, larger than female-headed households (FHHs). Male heads of households possessed a higher level of education than their female counterparts and owned a greater number of ox-ploughs and livestock. The mean area cultivated by male-headed households exceeded that of female-headed households for nearly all crops. Conversely, the average per capita landholding was nearly the same between male-headed households and female-headed households. Both categories of households obtained land via government allotment and utilized loans to procure seed and fertilizer. Key determinants influencing the gross value of output for MHHs included the farmer's age, family labor, farm size, livestock units, and inorganic fertilizer usage. The primary determinants influencing the gross value of output for FHHs included family labor, farm size, animal units, inorganic fertilizer, hired labor, and extension contact. The marginal value product (MVP) of family work is higher in male-headed households (MHHs) than the wage rate, whereas it is lower in female-headed households (FHHs), suggesting that MHHs enhanced their productivity through increased family labor utilization. The marginal value product of farm size was inferior to its factor price for male-headed households and superior for female-headed households, suggesting that female-headed households might enhance their productivity by expanding their cultivated land area. The marginal value product of inorganic fertilizer exceeded its factor cost for both male-headed families and female-headed households, indicating that

both household types might enhance productivity by augmenting their utilization of inorganic fertilizer. The disparity in gross output between genders was significant, mainly due to female-headed households utilizing fewer inputs. If MHHs and FHHs had equitable access to inputs, their productivity levels would presumably be comparable. In 1997, around 59% of male-headed households (MHHs) and 42% of female-headed households (FHHs) cultivated wheat, with the majority growing local varieties (70% of MHHs and 86% of FHHs). A notably greater percentage ($t = 5.7$; $p<0.05$) of male-headed households (30%) cultivated enhanced wheat varieties compared to female-headed households (14%). In MHHs, extension services and farm size positively influenced the adoption of improved wheat, while radio ownership and farm size enhanced the likelihood of adopting improved wheat for FHHs (Vincent, 2022b). Aregu, Puskur, and Sambrook assert that site-specific, commodity-based gender analysis is crucial for comprehending the distinct roles of women and men in the production, marketing, and decision-making processes of specific commodities, as well as their respective shares in the benefits. This analysis also identifies potential obstacles to the participation of both genders in market-led development initiatives and technology adoption. The gender analysis results of the IPMS project concerning PLWs demonstrate how such analysis can identify challenges and opportunities for advancing gender equality and women's empowerment by enhancing women's access to skills, knowledge, and assets and their involvement in market-oriented agricultural production, as well as their control over the benefits (Giuliano, 2017). Ragasa, Berhane, Tadesse, and Taffesse (2012) provide novel empirical evidence and a detailed analysis of the gender disparity in access to extension services and its impact on technology adoption and agricultural productivity. The research utilized a cross-sectional instrumental-variable

regression approach, analyzing a regionally representative dataset of over 7,500 families and 32,000 plots across four principal regions in Ethiopia, collected during the main season of 2010. Findings indicate that female heads of families and plot managers are less likely to receive extension services and access quality services compared to their male counterparts, even after accounting for plot, household, and village-level variables. The receipt of counsel from DAs is significantly and positively correlated with the adoption of enhanced seed and fertilizer among both females and males, as anticipated. Nonetheless, apart from their impact via fertilizer and enhanced seed utilization, interactions with or guidance from development agents are not substantial in any productivity models assessed for both females and males, which contradicts previous research. In certain crop-specific productivity models, the perceived quality of development agent visits and availability to radio is significantly and positively correlated with productivity levels for both female and male farmers. The findings underscore the necessity for productivity models differentiated by gender and crop (Santosh et al., 2016). Pionce (2016) notes that women constitute roughly 50 percent of the active labor force in Sub-Saharan Africa. Despite women's participation in diverse agricultural activities, they possess constrained access to resources and diminished decision-making authority relative to their male counterparts (FAO, 2015). These constraints and restrictions are expected to substantially impact women's performance levels in comparison to men's. This research assesses gender-based performance discrepancies, identifies factors influencing financial performance levels, and examines elements leading to the differences between male and female smallholders' performance in northern Ghana. The data utilized in this study were from the Agriculture Production Survey (APS) pertaining to the 2013-2014 cropping season. The research used

the Oaxaca-Blinder decomposition technique to assess and analyze the gender performance disparity into two components: endowment and structural factors. Gross margin serves as an indicator of a farmer's financial performance. The endowment effect is ascribed to variations in the explanatory factors, while the structural effect pertains to discrepancies in the returns of the explanatory variables. The study's results reveal a gender disparity among smallholder farmers, with male farmers exceeding female farmers' performance by 46 percent. The land area exerted the most substantial influence on the explained portion of the gender disparity, followed by tractor service. The endowment effect component of the decomposition models constitutes 35 percent of the gender gap, while the remaining 65 percent is attributed to the structural effect. The broader structural effect indicates that initiatives aimed at achieving equality in resource access for male and female smallholder producers would not eliminate the gender gap. Moreover, the elements that positively influenced the gross margin of smallholder farmers included land acreage, tractor services, and the types of crops produced. This research suggests that policymakers and agribusiness stakeholders should aim to diminish the gender disparity among smallholder farmers in northern Ghana by empowering women through enhanced access to land and tractor services (Santosh et al., 2016). Additional investigation into the determinants influencing the gender disparity in financial performance within agricultural endeavors is necessary. Religious affiliation influences many facets of society. Consequently, the research examines the intersection of religion and the sustainability of cotton production. Lang (2018) asserts that the durability of the relationship between religion and development has persisted since the emergence of human communities. Globally, there is evidence of the dynamic influence of religion in various developmental domains. Agriculture is pivotal to

the economic domains influenced significantly by religious influences and organizations. Lang notes that in the Bamenda grassfields of Cameroon, as in other regions of Africa, traditional religion and Christianity have profoundly influenced the agricultural industry. Lang's research employed a secular and historical methodology to investigate the influence of religion as a catalyst for agricultural advancement in the Bamenda grassfields. The study aimed to investigate how the concept of agriculture can be perceived through the lens of religion. A further outline of a presentation on the religious landscape of the Bamenda Grassfields is presented. Thirdly, an analysis of the influential impact of traditional religion and Christianity in agriculture within the region is presented. The research indicated that these issues are essential not just for areas requiring agricultural development but also due to the scant scientific investigation into the potential of religious and spiritual traditions for agricultural progress. Research indicated that religion has had a crucial influence in the advancement of agriculture in the Bamenda Grassfields (Rademaker & Jochemsen, 2019). Ager and Ciccone (2015) based their work on the premise that individuals within religious communities provide mutual insurance against certain idiosyncratic risks. The study advocated for the expansion of religious communities in areas where residents encounter heightened collective risk. The empirical analysis of the study utilized rainfall risk as a frequent agricultural risk factor in the nineteenth-century United States. Research indicated that a larger proportion of the population is affiliated with religious communities in counties with higher rainfall risk. Moreover, it is disclosed that the correlation between rainfall risk and affiliation with religious communities is more pronounced in predominantly agricultural counties and those subjected to heightened rainfall risk during the growing season (Marshall, 2014). Solomon, Yaro, and Ekong (2015) conducted a case

study examining spiritual and religious links and difficulties among rural communities, focusing on the indigenous Annang people of Akwa Ibom State. Primary data was gathered from 150 randomly chosen respondents and eight intentionally selected key informants through questionnaires and interview schedules. The data analysis encompassed both descriptive and inferential methodologies. The results reveal that 94% of respondents were aged between 21 and 60 years, 94% possessed formal education, all respondents identified as Christians, 61.3% were married, and 92% earned a maximum monthly income of NGN50,000. Fifty-two percent of participants identified farming as their principal occupation. Respondents had a strong inclination towards spirituality, with 98.7% attending religious services weekly and an additional 62.7% depending on fate, miracles, and the safeguarding provided by charms and amulets. The multiple regression analysis indicated no significant correlation between the chosen sociological parameters and respondents' propensity for spirituality, while the T-test analysis revealed no disparity in spiritual inclination between genders. The study advocates for the implementation of formal education aimed at enlightenment, reorientation, and counseling to diminish the propensity for spirituality. This will guarantee that local decision-making is impartial and grounded in factual information. Mhaka (2015) conducted a qualitative study to investigate the indigenous Shona religion and evaluate its significance for agricultural sustainability in modern Zimbabwean society. The study asserted that indigenous religion, which remains prevalent in Zimbabwe today, influences agricultural sustainability. Data collection was conducted via participant observation, documentary analysis, and interviews. The research revealed that certain Indigenous Shona religious beliefs and practices can still contribute positively to agricultural production during climate change. These play a crucial role in

safeguarding the natural resource base essential for effective agricultural production, although this function has been significantly undermined by political and economic events in the country. The research additionally discovered that specific religious rites can augment agricultural output. The research confirmed the presence of indigenous beliefs and behaviors that impede sustainable agriculture. It is advisable to revive, strengthen, accept, and adapt elements of indigenous religion that align with agricultural sustainability to improve agricultural practices. The research additionally advocates for analogous studies to be performed with Indigenous ethnic groups both locally and internationally (Pinto et al., 2014). Cultural beliefs and practices impact sustainable cotton farming. Vien (2018) investigated the interconnections between the cultures of ethnic minority groups in Vietnam's Northern Mountain Region (NMR) and their agricultural practices. The study discovered that NMR exhibits significant variation in terrain, climate, and biodiversity, alongside a high degree of cultural diversity. It is home to numerous distinct ethnic groups. Each tribe possesses a unique culture and is linked to a particular ecological environment. Each group, via its interaction with the specific area it inhabited, cultivated a slightly unique agricultural system. The findings elucidated the distinct methods by which various groups and civilizations have engaged with and adjusted to the distinctive environmental conditions affecting their production activities. Donfouet, Barczak, Detang-Dessendre, and Maigne (2017) aimed to furnish empirical evidence on the impact of crop diversity on agricultural output and the associated spillover effect. The analysis of production functions using spatial considerations from the comprehensive dataset indicates that crop diversity positively and significantly influences crop yield. Its marginal contribution is significant during periods of low rainfall in the agro-system. Moreover, geographical dependence is a

significant concern that can be elucidated by topographical, climatic, and agronomic limitations. Zhang and Li (2016) contend that to get greater yields, farmers may overutilize pesticides in the cultivation of crops such as rice, vegetables, or fruit, resulting in moral hazard behavior. The study investigated the influence of traditional culture on the moral hazard behavior of Chinese farmers in crop production. The research employed a semi-parametric logistic model to examine the influence of Chinese traditional culture on the moral hazard behavior of farmers. Research indicated that Chinese traditional culture positively influences the reduction of farmers' excessive pesticide usage in crop production, thereby mitigating moral hazards in agricultural product safety. When controlling for extraneous variables, the likelihood of moral hazard diminishes by 15% if farmers incorporate their traditional culture into their production decisions. Furthermore, the likelihood of moral hazard diminishes by 17% when farmers see traditional culture as a significant constraint on pesticide usage. The study's findings offer encouraging data about the influence of Chinese traditional culture in reducing farmers' excessive pesticide usage. Sokoni's (2018) study on the Tanzanian cotton sector demonstrates the significance of both price and non-price government policies in cotton production since the 1950s. The results indicate that there is no aggregate supply response for cotton. The pricing approach led to a decline in cotton production during the 1970s and early 1980s. Macroeconomic policies were determined to adversely impact cotton production. A study was conducted on economic difficulties and sustainable cotton production, comparing cotton-producing households in Zimbabwe and Tanzania. Bryan et al. (2013) observed that in Tanzania, variations in respondents' cotton sales are influenced by households' access to arable land and possession of draught power, whereas in Zimbabwe, differences are attributed to a

combination of ownership-related assets and access to manufactured inputs. This outcome strongly aligns with the findings of Falconnier et al. (2015), which indicated a significant correlation between on-farm capital and cotton productivity. Variable inputs may encompass labor, fertilizer, water, insecticides, and seeds, which can be acquired in preferred quantities based on current prices. Fixed factors encompass land, public elements like infrastructure and extension services, as well as external characteristics like weather and proximity to markets. The farmer is presumed to select variable input combinations that optimize profit, constrained by existing technological limitations, based on the given output and input prices. The resolution to this maximization issue comprises a collection of input demand and output supply functions (Ahmed & Ojangole, 2019). Numerous empirical investigations have employed this approach in production analysis. A review by De Janvry and Sadoulet (2015) presents several studies that utilized the idea of production economics. Binswanger et al. (1984) evaluated a cropping system for the semi-arid tropical regions of India utilizing a production system based on 19-year time series data from 93 districts. The research utilized generalized Leontief and normalized quadratic models. Due to the uncertainty of output prices at the time of planting, anticipated prices were utilized. Rubhara and Mudhara (2019) investigated the factors influencing cotton production in the Gokwe North district and discovered that cotton production correlates positively with farm size, the educational level of the household head, the value of agricultural capital, the quantity of cotton sprayers, and the timely eradication of tsetse flies from the village. This study highlighted the significance of education as a factor influencing cotton production; nonetheless, it is essential to examine additional historical factors affecting cotton production for the purpose of policy evaluation. A pertinent study by Ferro (2019) analyzed

the impact of agricultural price policy on production in Argentina by employing a translog model for the sector. They utilized time series data spanning an extensive duration from 1940 to 1980. They examined three variable inputs alongside three fixed factors: land, rainfall, and time in years as indicators of technological progress. Likewise, Mangieri (2019) examined the impact of pricing on agricultural foundations. Employing the duality principles between production and profit functions; specify a normalized quadratic function to assess the impact of diverse policy incentives on production in Zimbabwe. Meuwissen et al. (2019) describe a production process in the context of interventions and sustainable cotton production as integrating several inputs to generate a specific output. Aggregating all accessible approaches is economically represented by an isoquant map, a production function, or indirectly through a cost or profit function. Cotton production involves the integration of inputs to generate output. Soumare et al. (2021) conducted a study in Zimbabwe that consolidated all outputs, including crops and livestock, into a singular index without differentiating between distinct crops. The study indicated that the key variables influencing the production function were identified as research and development (R&D) expenditures, extension expenditures, and meteorological conditions. The research indicates that agricultural productivity is generally influenced by adopting new technologies, which are derived from research and development investments, imported from overseas, and disseminated to farmers through extension services. Conclusions drawn from such research may provide issues, as distinct crops exhibit varied responses to different production parameters; thus, it is essential to investigate the unique reactions of individual crops to these factors. Conversely, Rubhara and Mudhara (2019) employed a profit function to ascertain the factors of agricultural production in Zimbabwe

econometrically. The research highlighted the significance of state marketing infrastructure and enhanced credit accessibility in promoting crop production. Their findings indicated that research and development had a negligible impact on crop yield, contrary to the conclusions of Phiri (2018). Mogire et al. (2015) documented that the establishment of support services was a significant factor in the success of the cotton industry. He observed that the advancement of marketing services, extension and training, seed production, and access to inputs was essential for enhancing cotton production, particularly within Zimbabwe's smallholder sector. Ackim (2013) examined the long-term factors influencing cotton production in various African nations, including Zimbabwe, from 1960 to 2002. In Zimbabwe, the area cultivated by smallholders and seed cotton production exhibit a moderate yet substantial correlation with seed cotton prices from both the current and previous seasons throughout the 1990–2001 period. The Pearson correlation coefficient for the present seed-cotton pricing (denominated in 1990 ZW$) and the quantity of seed cotton produced during this period is 0.53, significant at the five percent level.

2.3 Research Gaps Addressed by the Current Study.

1. Ineffective marketing methods bolster cooperative groups, eliminating the exploitation of intermediaries.

2. Competition from analogous products, including inexpensive imports and second-hand garments (Mitumba) from the West. It is necessary to regulate or cease the importing of the same.

3. It is necessary to restore or establish ginneries near the production area to reduce the distance for transporting cotton to the ginneries for market access.

4. Inferior seed quality. Additional study is necessary to cultivate and enhance clean, high-quality seeds tailored for particular places.

5. Attitudinal shifts concerning detrimental cultural attitudes, particularly about retention, gender issues, and religious convictions.

The current study indicates that small-scale farmers in the business lack synergy, resulting in elevated production costs. Quality issues are prompting small-scale farmers to discontinue cotton production despite elevated demand. Implementing cluster farming through collective farming is anticipated to enhance the cotton value chain and enable small-scale farmers to reap the advantages of collaboration and resource mobilization, as demonstrated in other countries, notably China (Verheyen et al., n.d.-b). Collective farming can enhance productivity, training, funding, marketing, and employment, elevate living conditions, mitigate poor harvests, and augment efficiency. These studies indicate that small-scale farmers have distinct problems and require adequate training, which impacts cotton yield per acre. There should be a reduction in the excessive reliance on traditional Indigenous production methods and small-scale farmers' utilization of inferior seeds. Small-scale producers globally unequivocally recognize the need to adopt cluster farming to enhance efficiency and effectiveness in cotton production and selling. Cotton production is a rapidly expanding sector due to the persistent and growing market driven by global population increase; therefore, further research is necessary in this emerging field,

especially regarding its impact on the diverse regions of the country, particularly the Arid and Semi-Arid Lands, which constitute a significant portion of Kenya's idle land (Rutto et al., 2022). New strategies, funding, marketing, technology, and innovations require assessment, and those that exhibit their worth and impact will be integrated into the cotton sector. The promotion of cluster farming is warranted due to its advantages in production quality, outcomes, and substantial productivity improvements. Policies and memoranda of association are required to distribute investment advantages among farmers, financiers, the state, and the private sector. The study aimed to resolve issues that could ultimately bridge the observed gaps contributing to the current fall in cotton production and the adverse perception of the industry. The gaps to be addressed encompass the use of technologies for enhanced cotton yields and quality. Enhanced production necessitates the reduction of input expenses and the adoption of contemporary spraying methodologies to get high-quality lint at diminished production prices. The second gap to address is the inadequate marketing channels by enhancing cooperative societies, thus eliminating the exploitation of intermediaries. Another deficiency is the substandard quality of seeds. It is essential to rehabilitate and establish ginneries to guarantee the processing of recognized cotton types, thereby producing a known pure, high-quality seed. Another gap that needs attention is competition from like products, including inexpensive imports from the East, particularly China and India, as well as second-hand clothing (Mitumba) from the West. It is necessary to regulate or cease the importing of the same. Ultimately, the community must be empowered to transform attitudes on faith, cultural values, and gender inequality.

Table 2.5 ***Summary of Literature Review and Research Gap***

Thematic Area	Author(s)	Focus of the Study	Knowledge Gaps	Focus of current study
Religion	Lang (2018),	Religion and agricultural development	Individual crop production e.g cotton	Religion sustainability of cotton production
Religion	Ager and Ciccone (2015),	Religion and risk in agricultural communities	Specific crop production in relation to religion e.g cotton	Religion sustainability of cotton production
Religion	Zhang and Li (2016)	Traditional Chinese culture's influence on farmers' moral hazard practices	Religion and crop sustainability	Religion and sustainability of cotton production
Religion	Yaro and Ekong (2015	Spiritual as well as religious relationships and intricacies among the native Annang people of	The relationship between religion and	Religion and cotton production

		Akwa Ibom state in rural villages.	cotton production sustainability	
Religion	Mhaka (2015)	Ancient Shona religion in order to evaluate its applicability to agricultural sustainability in modern Zimbabwean society.	The relationship between religion and cotton production sustainability aside from agriculture in general	Religion and sustainability of cotton production
Cultural Beliefs	Vien (2003)	The agricultural practices and customs of the ethnic minority groups residing in Vietnam's Northern Mountain Region (NMR)	A relationship pitting culture and of cotton production	Culture and sustainability of cotton production
Cultural Beliefs	Donfouet, Barczak, Detang- Dessendre and Maigne (2017)	Effect of crop diversity on crop production and spill over effect	Culture and cotton production sustainability	Culture and sustainability of cotton production

Gender Issues	Peterman, Quisumbing, Behrman and Nkonya (2010	Gender differences and agricultural productivity	Gender and its relationship to cotton production sustainability	Gender and sustainability of cotton production
Gender Issues	Udri (1995)	Implication of equilibrium allocation of resources on Pareto efficiency	Specifics on gender and cotton production sustainability	Gender and sustainability of cotton production
Gender Issues	Hill and Vigneri (2009)	Impact of gender specific constraints on the production and marketing of cash crops	Gender and cotton production in a sustainable fashion	Gender and sustainability of cotton production
Gender Issues	Tiruneh, Tesfaye, Mwangi and Verkuijl (2001)	The significance of gender in the ownership of resources and making decisions in the central highlands of Ethiopia's Ada, Lume, and Gimbichuworedas mixed agricultural systems	Gender and sustainability of cotton production	Gender and sustainability of cotton production

Gender Issues	Aregu, Puskur and Sambrook ()	Understanding the distinct roles that men and women play in the production of particular commodities, in marketing along with decision-making, as well as their share of the benefits is dependent on site-specific commodity-based gender analysis. It is also crucial to identify potential obstacles that may prevent men and women from participating in market-led efforts to develop and from adopting new technologies.	Gender and cotton production in a sustainable fashion	Gender and sustainability of cotton production
Gender Issues	Ragasa, Berhane, Tadesse and Taffesse (2012)	Variations in agricultural production and technological adoption identified due to gender disparities in access to services for extension.	Gender and sustainability in crop farming and especially cotton farming	Gender and sustainability of cotton production
Gender	Diiro, Seymour, Kassie,	Relationship between maize productivity in	Gender and cotton	Gender and

Issues	Muricho,andMuriithi	western Kenya and women's empowerment in agriculture,	production in a sustainable fashion	sustainability of cotton production
Gender Issues	Romero-Paris ,	Importance of agriculture, rice production and women's roles in rice based agriculture	Gender and agriculture and especially the sustainable production of cotton	Gender and sustainability of cotton production
Gender Issues	Nyakwara, Mokua, Moturi and Gethi (2015)	Gender roles and associated environmental impacts during small-holder farmers' cultivation of oil crops in Kenya's Lare Division as well as Nakuru County	Gender factor and cotton production sustainability	Gender and sustainability of cotton production
Gender issues	Mrunalini and Snehalatha (2010)	gender prioritized drudgery experiences in crop production activities	gender and cotton pr4oduction sustainability	Gender and sustainability of cotton production

Distance from Buying Centers	Ngongo (2016)	factors influencing the adoption of modern agricultural technologies by small scale farmers	Distance from buying location and cotton production sustainability	Distance from buying centre and sustainability of cotton production
Distance from Buying Centers	McCall (1985)	When analyzing the potential for agricultural growth at the village level, the aspect of relative position is sometimes overlooked.	Distance from buying location and cotton production in a sustainable fashion	Distance from buying centre and sustainability of cotton production
Distance from Buying Centers	Kibaara, Ariga, Olwande and Jayne (2009)	Trends in the Kenyan agricultural productivity	Distance and cotton production in a sustainable fashion	Distance from buying centre and sustainability of cotton production
Marketing	Zeller, Diagne and Mataya ()	Determines the adoption of these two crops and what kind of income effects follow from	Marketing and sustainable cotton	Marketing and sustainability of cotton

		adoption	production	production
Marketing	Poulton, Kydd and Dorward (2006)	The goals for investment along with policy reform in this field is outlined in this article. We begin by briefly discussing the theoretical aspects of the coordination issues at hand, then moving on to discuss the demand as well as supply constraints that smallholder farmers face, price stabilization strategies, and the coordination of assistance services.	Marketing and sustainable cotton production	Marketing and sustainability of cotton production
Marketing	Begna, Yami, Lemma, Solomon and Etana (2015)	Crop production, marketing systems and constraints so as to set proper development plans to improve food security in the future.	Marketing and sustainable cotton production	Marketing and sustainability of cotton production

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter primarily addresses the geographical characterization of the study area, research design, target population, sampling methods, data collection instruments, data collection processes, and data analysis methodologies.

3.2 Geographical Description of the Study Area

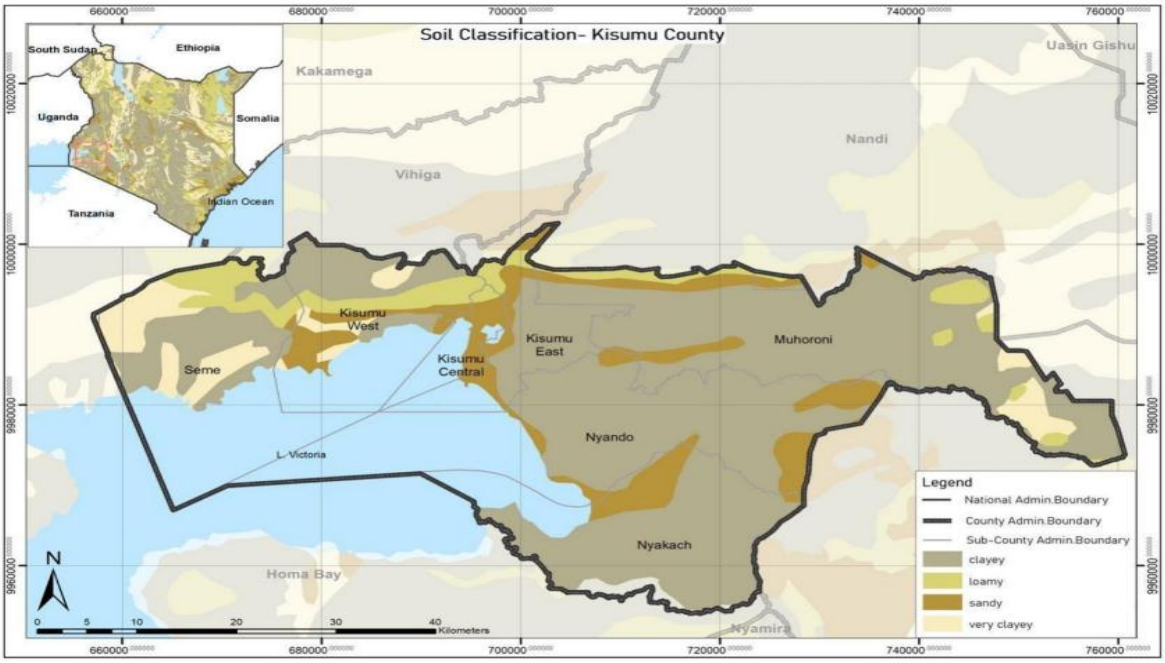


Figure 3.0: Kisumu County soil classification map (Boniface, 2015)

Figure 3.1 Kisumu County Cotton Cooperative societies (ASDSP, 2022)

Kisumu County is one of 47 counties in Kenya. Homa Bay County borders the county to the south, Nandi to the northeast, Kericho to the east, Vihiga to the northwest, and Siaya to the west. Lake Victoria, the second largest freshwater lake globally, encircles Kisumu. It encompasses 567 square kilometers of water and 2,086 square kilometers of land, constituting 0.36% of Kenya's total 580,367 square kilometers. Estimates place the population at 1,155,574 individuals, spread across seven sub-counties or constituencies: Nyakach, Muhoroni, Nyando, Kisumu East, Kisumu Central, Kisumu West, and Seme, in addition to 35 wards. The urban population is 440,906, while the rural population is 714,668 (K Oyoo, 2023). The study region comprises five cotton-cultivating sub-counties within Kisumu County, each hosting cotton cooperative organizations. The sub-counties comprise Nyakach, which hosts the Nyakach Cooperative Society; Nyando, home to the

Nyando Cooperative Society; Kisumu East, featuring three cooperative societies: Kisumu East, Kano-Kajulu, and Kobura Multi-purpose; Muhoroni, with the Muhoroni Cooperative Society; and Seme, which contains the Seme Cooperative Society. Additionally, the overarching New Kisumu District Cooperative Society exists. Kisumu County adjoins Siaya, Kakamega, Kericho, and Homa Bay counties. The five sub-counties possess black cotton soils conducive to cotton cultivation. The county exhibits a bimodal precipitation pattern characterized by extended and brief rainy seasons. Precipitation transpires from mid-March to late June, whereas brief rainfall events occur from late August to mid-November (Odhiambo et al., 2014). Consequently, the rainfall intensity ranges from 1400 to 1600 mm annually in the higher region and from 900 to 1000 mm annually in the lower region. Nonetheless, socioeconomic issues influence sustainable cotton production, encompassing land size, availability of agricultural supplies, requisite labor intensity, insufficient understanding of cotton cultivation, regulatory laws, and inadequate infrastructure and storage facilities. This study examines socioeconomic characteristics, including gender, religion, cultural attitudes, marketing, and proximity to purchasing hubs. Kisumu County possesses the capacity to enhance cotton production. Nevertheless, the yields remain inadequate, and the cotton quality remains subpar with no indications of enhancement, rendering the industry's sustainability unfeasible. Consequently, the study underscores various socioeconomic problems obstructing sustainable cotton production and proposes mitigations.

3.3 Research Methodology

Mutungwa and Orodho (2014) characterize a research design as a framework or blueprint devised to elicit solutions to research inquiries. It is the intellectual framework through which solutions to research inquiries emerge. It serves as the framework for data collection, measurement, and analysis (Du Toit, 2014). This study employed a mixed-methods, descriptive, and correlational approach that integrated qualitative and quantitative analysis. A descriptive survey gathers data through interviews or questionnaires administered to a sample of individuals (Wright et al., 2016). It can also gather data regarding societal issues (Mutungwa & Orodho, 2014). Descriptive research can provide a foundation for precisely characterizing an observation (J.L. Myers et al., 2013). It also aids in delineating the attributes of a variable outside the researcher's control. Explanatory research transcends simple description by seeking to elucidate the underlying reasons for a phenomenon's existence by identifying causal links (Sileyew, 2019). Interviews and questionnaires with a sample of previously identified persons yielded descriptive data. Correlation design evaluates the extent of the association between two or more variables (Orodho, 2014). We utilized statistical studies to investigate the correlations among different parameters influencing sustainable cotton production. The study employed a mixed design to elicit comprehensive responses, enhance our understanding of the examined phenomena, and test the causal relationship between socioeconomic determinants and sustainable cotton production in Kisumu County. Theswell (2009) and Saunders et al. (2013) advocate for the mixed-method research strategy since it allows an investigator to analyze a phenomenon's background, processes, and interactions while accurately measuring attitudes and consequences. The mixed research method combines the benefits of both quantitative and

qualitative research (Creswell, 2009; Babbie, 2011). The explanatory research approach facilitates the generalization of findings from the sample survey. Conversely, the cross-sectional design facilitates the distribution of surveys to numerous respondents within a brief timeframe (Owino et al., 2014). The statistical correlation analysis technique evaluates the strength of the relationship between two quantitative variables. A high correlation indicates a robust relationship between two or more variables, whereas a weak correlation signifies minimal association among the variables. In other words, we examine the robustness of this link using readily available statistical data. The study established a correlation between gender, religion, culture, market, and proximity to purchasing hubs about sustainable cotton production in Kisumu County.

3.4 Study Population

The 2019 population census indicates that Kisumu County has a population of 1,155,574. In 1817, farmers cultivated cotton (SIVCAP, Report). Six hundred farmers cultivate cotton as a monoculture, according to the AFFSA Report of 2019. The target population in Kisumu County consisted of 600 cotton farmers aged between 18 and 60 years, along with 60 cotton stakeholders, which included 5 KALRO staff, 5 CODA staff, five cooperative department officers, five administrative staff, ten agricultural extension staff, ten male youths, and ten female youths, as detailed in tables 3.1 and 3.2 below.

Table 3.1: ***Target population of cotton farmers in different age groups.***

AGE (years)	Target Population of cotton farmers	Sample size
18-31	200	80
32-45	300	120
46-60	100	40
Totals	600	240

Source: Survey Data, 2017

Table 3.2: ***Target population of stakeholders associated with cotton farming***

Link	No. of the target population	Sample size
KALRO staff	5	4
CODA staff	5	4
Cooperative Department officers	5	3
Administration Staff	5	5
Agriculture Extension Staff	10	10
Members from existing cooperative	10	9

societies		
Male youths	10	9
Female youths	10	9
Totals	661	293

Source: Survey data, 2017

The study employed a 95% confidence level with ±5% precision to ascertain the sample size. This confidence level indicates that, within a normal distribution, approximately 95% of the sample values fall within two standard deviations of the actual population value (e.g., mean). Thus, selecting a 95% confidence level suggests that 95 out of 100 samples will contain the actual population value within the previously specified range of precision established by Israel in 1992 (Singh & Masuku, 2014). The precision level, often called sampling error, denotes the interval between the actual population value and the estimated value, typically expressed in percentage points (Cohen et al., 1988). Cohen defines the statistical precision of a sample statistic as the degree to which it approximates the relevant population value, recognizing that it is an estimated value because the actual population value is typically unknown.

3.5 Sample Size Calculation and the Sampling Techniques

Singh and Masuku (2014) assert that sampling involves the selection of units from a target population to extrapolate findings to the broader population through sample analysis. The study utilized a straightforward stratified sampling method to obtain a sample that

accurately represents the total population. We used this strategy to choose a sample of cotton producers after determining the sample size. The population subgroups exhibited a common trait. A simple stratified sample addresses changes in the measurements of interest across different subgroups, ensuring representation from all subgroups for age. When a population of interest exhibits heterogeneity in particular features, Etikan and Bala (2017) assert that a stratified random sample is the most suitable sampling method for obtaining an optimal representative sample. The study intentionally picked 293 respondents due to the substantial sample size. We determined the investigation sample size using Israel's (1992) formula, as detailed below.

$n = \frac{N}{1+N(e)^2}$ …… (Equation 1)

Where: n = the sample size, N = the population size, e = precision level (0.05) Therefore;

n= $\frac{N}{1+N(e)^2}$n = 600 ÷ [1+600(0.0025)] n= 600 ÷ [1+1.5]n=240

Table 3.3 ***Sample size calculation***

Sample Size Calculation; Category of sample	Target population	Sample Size (n) for Precision of ±5% at 95% level of confidence using: $n = \frac{N}{1+N(e)^2}$	Sampling Technique

Cotton farmers	600	240	Simple random sampling
KALRO staff	5	4	Census
CODA staff	5	4	Census
Cooperative Department officers	5	3	census
Administration Staff	5	5	Census
Agriculture Extension Staff	11	10	Census
Members from existing cooperative societies	10	9	Census
Male youths	10	9	Simple random sampling
Female youths	10	9	Simple random sampling
Totals	661	293	

Source: Survey data (2017)

The Israel (1992) formula established the sample size, resulting in a representative sample of the target population. The representative sample consisted of 240 cotton farmers, 4 KALRO staff, 4 CODA staff, 10 agricultural extension personnel, two representatives from each of the five cotton-growing sub-counties, nine members from existing cooperative

societies (2 chairpersons, 2 treasurers, 5 ordinary members), 3 cooperative department officers, 9 female youths, 9 male youths, and 5 administrative staff from the five sub-counties, resulting in a total sample size of 293 individuals. The study targeted a specific set of respondents. Consequently, this allows the researcher to comprehensively evaluate the relationship between the variables and guarantees the inclusion of all demographic categories within the study population. The study focused on persons aged 18 and older engaged in cotton production for subsistence and commercial objectives. We also represent the agricultural extension personnel and administration in the designated regions.

3.6 Data Collection Instruments

Research instruments comprised questionnaires, interview schedules, focus group talks, and observational methods. A questionnaire is a tool for collecting data from a substantial sample across several areas or countries. The questionnaires were confidential, time-efficient, and administered in paper format, eliminating the potential for interviewer bias. The instrument creation addresses prior research on factors affecting sustainable cotton production (Omona, 2013)—the questionnaire consisted of eight sections. The initial segment aimed to gather broad information about the demographic profiles of the respondents. The second segment posed inquiries concerning the sustainability of cotton production. The third through seventh portions posed inquiries regarding religion, cultural beliefs, gender concerns, marketing, and distance. The eighth segment posed inquiries regarding the intervening variable. The acquisition of primary data via a semi-structured questionnaire proved effective. Qualified personnel administered the questions. This group of employees possesses the necessary information about socioeconomic variables affecting

sustainable cotton production. We gathered qualitative data using open-ended questionnaires. We collected quantitative data using closed-ended questionnaires, utilizing both primary and secondary data collection methods in line with the study objectives. We introduced the questionnaire to respondents through a cover letter. A questionnaire was considered suitable for the study as it accommodated the differences in measurement scales, consistent with the present research. Furthermore, a questionnaire facilitates the collection of both quantitative and qualitative data for a researcher. Interviews consist of orally posed questions and encompass numerous formats. Structured interviews, administered uniformly by posing identical questions to each survey participant, proved highly useful in these instances. We favored them due to the high trustworthiness of the collected information. Each informant answers the identical question as the others. Furthermore, due to the researcher's pursuit of precise information, structured questionnaires was the optimal method for collecting comprehensive data. The approach is systematic, allowing the researcher to thoroughly examine a specific topic before progressing to the subsequent one. The organized questionnaire was efficient, as respondents solely addressed the researcher's inquiries. Through this, the researcher acquires a comprehensive and nuanced understanding of the subject from the responder. The questions devised prior to the interview are highly systematic and thorough. Furthermore, the gathered data is measurable. The study employed an interview schedule to obtain comprehensive information from participants. Malhotra and Birks (2012) advocate for the examination of secondary data as a requirement for the collection of primary data. This study gathers secondary data in accordance with this recommendation. The researcher obtained data by examining socioeconomic aspects affecting sustainable cotton production.

These methodologies facilitate a deeper comprehension of the variables studied by the researcher. The researcher gathered the qualitative data for the study by posing open-ended questions throughout the interviews. An interview involves a direct dialogue between two individuals to gather pertinent information for research purposes. We implemented this approach to gather qualitative and quantitative data on the socioeconomic issues influencing sustainable cotton production. We conducted unstructured interviews with cotton growers, gathered their responses, and completed questionnaires. We utilized an audio recorder, extracted the material, and completed the questionnaires. Focus group talks constituted a crucial component of the exercise. This data collection strategy emphasized qualitative research. The group is typically distinctive regarding its goal, size, composition, and methods. The groups of 4 to 10 individuals from the target population were homogeneous regarding age, gender, and career. Focus group talks can rapidly yield substantial information and effectively uncover beliefs, ideas, or opinions within a society. They can evaluate requirements, formulate interventions, experiment with novel concepts or programs, or enhance current ones. The researcher faced the issue of requiring greater control over the discussion's flow, rendering the results difficult to interpret. Observation serves as an additional instrument, yielding insights into actual behavior. The observation was beneficial, as certain behaviors are habitual, prompting individual inquiries. Direct observation contextualizes behavior, enhancing the researcher's comprehension. The researcher employed unstructured observation, assuming the role of an onlooker to obtain descriptive data. Unstructured observations facilitate the comprehension of behavioral patterns within their physical and social contexts.

3.7 Data Collection Procedures

Data collection entails systematically gathering specific information to validate or disprove certain truths. The collection approach entails acquiring and scrutinizing specific facts to formulate replies to pertinent inquiries and assess the outcomes. The goal is to conduct a thorough investigation into a particular subject matter. Data collection and subsequent testing aim to elucidate a phenomenon (Saczynski et al., 2013). The researcher comprehended the specific type of data intended for collection. We collected data through questionnaires, interviews, focus group discussions, observations, and the use of data sets. The researcher and study assistants handed questionnaires to the cotton producers, who were the respondents. We gave the respondents enough time to complete the questions and collected the questionnaires after the response period. The researcher and research assistants interviewed selected respondents, recording their responses to specified questions. We employed focus group discussions to gather data from cotton cooperative officials, CODA, KALRO, administrators, and Ministry of Agriculture personnel, corroborating the acquired material. The researcher utilized a checklist to document the observed behaviors accurately. Subsequently, the researcher documented the observations. We conducted this study to gather data that facilitated the examination of the topic using the instruments mentioned earlier. The lead researcher assumed complete responsibility for the study and managed the fieldwork. Seasoned research assistants facilitated the administration of specific questionnaires. The lead researcher purified, revised, encoded, and examined the gathered data. The lead researcher distributed 293 questionnaires to senior and middle management personnel of cotton production firms and farmers in

Kisumu County. We retrieved the completed replies for processing within two weeks of the delivery time. The data collection process spanned six weeks. We then systematically organized and structured the data for analysis and presentation. A report was subsequently written. The report, which included the study's findings and the researcher's commentary, followed the data gathering and analysis. Existing data refers to data obtained from pre-existing sources to explore research inquiries distinct from the original purposes for which the data was collected. I reviewed institutional records, policy documents, and associated preserved data. I obtained qualitative data via questionnaires, which offered supplementary information and corroborated it. We engaged two research assistants to facilitate the data collection process; they clarified interview questions for respondents and addressed any other concerns related to data collection. The tools employed comprised scholarly articles, surveys, and archived data. We used the following instruments to collect the primary data: Observation systematically records respondents' activities, actions, and behaviors. We subsequently processed and presented the acquired data. Interviews were the most favored method. We deliberately selected the agricultural personnel from the cotton-producing sub-counties to participate in the focused group discussions. Simultaneously, we presented questionnaires to respondents during individual interviews, enabling comprehensive investigations and primarily facilitating probing for more responses and clarification from the study subjects. The primary informants were the agricultural representatives in the cotton-producing regions. The surveys were straightforward and not highly technical, containing a balanced mix of closed and open-ended questions. This facilitated the translation of queries for individuals experiencing problems. In addition to primary data, which served as the principal source of information, the research benefited from credible

literature from various sources, both published and unpublished. The study was informed by reports from pertinent offices, including AFFA (Agriculture et al., formerly CODA), the CDA's office, and ASDSP county reports, books, and periodicals. Data from numerous website downloads related to the same project supplemented the previously mentioned sources. We integrated the analysis and presented it as a cohesive entity to illuminate the investigation. Consequently, we examined, refined, and presented all acquired data qualitatively and in tabular form.

3.8 Data Analysis

Data analysis involves scrutinizing obtained survey data to draw conclusions and make inferences. It necessitates revealing fundamental structures. The researcher identified significant factors, detected anomalies, evaluated underlying assumptions, analyzed the data, and drew conclusions. The data type, whether qualitative or quantitative, determined the analytical method employed. We used fundamental descriptive analysis to examine qualitative data, including respondents' perspectives on cotton production. The study objectives necessitated theme analysis. The analysis of quantitative data depends on the nature of the investigation. The measurement of the correlation coefficient revealed the association between two variables. The correlation coefficient ranges from 0 (indicating no association between the variables) to -1 (indicating a perfect negative correlation). It is important to note that in correlation research, the researcher solely examines the extent of the association between variables rather than the impact of one variable on another. This research study utilized descriptive and inferential statistics to examine data from groups of individuals. Descriptive statistics analyze data by effectively describing,

illustrating, or summarizing it. It delineates the fundamental characteristics of data inside a sample. People often distinguish descriptive statistics from inferential statistics. Descriptive statistics delineate the characteristics of the data or its manifestations. Inferential statistics draw conclusions that extend beyond the current dataset. Descriptive statistics delineate the observable attributes of a dataset (either a population or a sample). Inferential statistics concentrates on deriving predictions or generalizations for a larger dataset from a sample. The researcher employed many tools in the aforementioned statistical investigation. The arithmetic mean, sometimes called "the average," is fundamental in data analysis. We divide the total of a list of numbers by the number of elements in the list. The mean facilitated the identification of the primary trend within the data set, offering a swift overview of the information. A further benefit of the mean is its simplicity and rapid calculability. The mean can be a dangerous tool if it is not used in conjunction with other tools. In particular data sets, the mean is strongly associated with the mode and the median, which are two other metrics indicative of central tendency.

3.8.1 Reliability and Validity of the Research Instruments

Reliability denotes the constancy of a measurement. Psychologists identify three forms of consistency: temporal consistency (test-retest reliability), item consistency (internal consistency), and researcher consistency (inter-rater reliability). The research employed the internal consistency reliability assessment. Internal consistency refers to the uniformity of individuals' replies across several items within a multi-item assessment. All items on such tests must represent the same underlying construct, resulting in correlated scores among individuals. The researcher evaluates internal consistency through data collection and analysis (Mohajan, 2017).

The degree to which a test accurately assesses its intended evaluation is known as validity. The research employed the Chi-Square Test: The Chi-square (N2) test provides an alternative approach for assessing the importance of the disparity between two proportions. We employed the chi-square test to compare numerous groups. The study employed the test to ascertain the significant differences in the impacts of socioeconomic factors on sustainable cotton production and development. The chi-square test assessed the validity and significance of the sample size employed in the investigation.

3.8.2 Ethical Considerations

Kisii University authorized the fieldwork following approval from the defense team, which comprised the student's supervisors. Kisii University submitted a formal request to the National Council for Science, Technology, and Innovation (NACOSTI) seeking authorization to allow the researcher to undertake the study. The county commissioner and

the county director of education in Kisumu County received the study authorization from NACOSTI. The local administration authorized identification to facilitate research activities and alleviate community distrust. The local administration granted the authorizations, acknowledging the importance of conducting research honestly and peacefully. Only the survey administrators knew the participants' identities, ensuring complete secrecy. The researcher secured consent from the participants, who engaged in the study voluntarily.

CHAPTER FOUR

RESULTS

4.1 Introduction

In keeping with the goals of the study, this chapter summarizes and analyzes the research results. It is divided into four sections: outcomes, data analysis, results presentation, and results interpretation. Reporting tools allow the researcher to extract and display data in charts, tables, and other formats.

4.2 Response Rate and Respondents' Characteristics

The analysis of the response rate is displayed in Tables 4.1 and 4.2 below:

4.2.1. Profile of the target population and respondents

The target population was 600 cotton farmers aged between 18 and 60 and 60 cotton stakeholders. Israel formula calculated the sample size (respondents). Some cotton farmers were assisted in filling out the questionnaires since they could not do it independently due to a lack OF proper schooling. Some respondents refused to participate in the research due to fear voluntarily. Some female respondents could not take the chance of filling out the questionnaires without permission from their male counterparts. The study received back 214 filled questionnaires, while 26 were not returned.

Table 4.1: ***Target population of cotton farmers of different age groups.***

AGE (yrs)	No. of target population		Sample Size (n) for Precision of ±5% at 95% level of confidence using: $n = \frac{N}{1+N(e)^2}$	Sample size with respect to target population ratio: 200:300:100 (2:3:1) of 240 cotton farmers.	Filled questionnaires	Questionnaires not returned
18-31	200	Total: 600 cotton farmers	240 cotton farmers	80	71	9
32-45	300			120	110	10
46-60	100			40	33	7

Source: Survey data (2017)

Table 4.2: ***Target population of stakeholders associated with cotton farming***

Link	No. of target	Questionnaires returned	Questionnaires not returned
KALRO staff	5	4	0
CODA staff	5	4	0
Cooperative Department officers	5	4	0
Administration Staff	5	4	0
Agriculture Extension Staff	10	10	0
Members from existing cooperative societies	10	9	0
Male youths	10	9	0
Female youths	10	9	0
Total	60	53	

Source: Survey data (2017)

The study administered 53 questionnaires to the links associated with cotton farming in Kisumu County, and all questionnaires were returned. These questionnaires were filled out through interviews of willing individuals. As such, the study completed all the

questionnaires because the interviews were one-on-one. In addition, only willing individuals agreed to be interviewed; hence, a 100 % response was achieved in this sample category.

4.2.2. Analysis of target response and representative sample

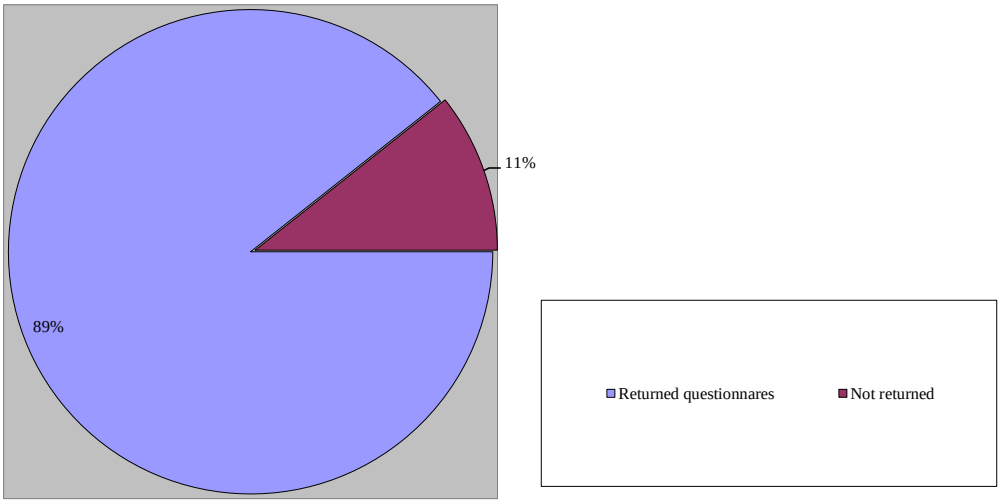


Figure 4.1: Cotton Farmers' percentage response (Source: Survey data, 2017)

The percentage response of cotton farmers was more than 50%. This indicates that the study successfully achieved more than half the sample size of cotton farmers.

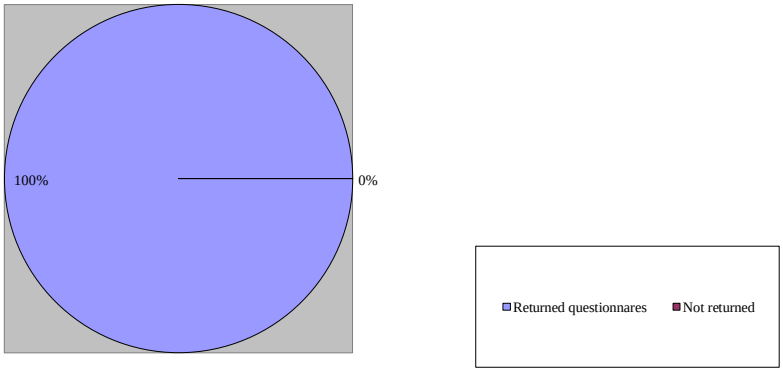


Figure 4.2: Stakeholders associated with cotton farming percentage response (Source: Survey data, 2017)

The percentage responses of the cotton farmers and the links to cotton farming provide a clear picture of the positive responses to the questionnaires. This shows that the information obtained from the study captures the views of the target population from the selected sample size. On average, over 80% of responses were achieved.

4.2.3. Validity of data sample

This test shows that the sample size used to determine socioeconomic factors' effects on sustainable cotton production in Kisumu County provided accurate results. A significance test employing the Chi-Square test was used to validate this sample. It shows that the sample size used is a good representative of the target population; hence, the results obtained by the sample population captured the views of the target population. Thus, the target population was well represented.

Test for the significance of a representative sample of cotton farmers to the target population of cotton farmers.

Table 4.3 ***Calculations of the target population of cotton farmers.***

Group	Frequency (f)	Median (x)	Fx	x-$\bar{X}$	(x-$\bar{X}$)^2	f(x-$\bar{X}$)^2
18-31	200	24.5	4900	-11.5	132.25	27237.78
32-45	300	38.5	11550	2.5	6.25	339.9
46-59	100	52.5	5250	16.5	272.25	26666.89
Total	600		21700			54244.57

Source: Survey data (2017)

Mean $\bar{X} = \frac{\sum fx}{\sum f} = \frac{21700}{600}$ = 36.17 (target population mean)

Population variance=$\frac{(\sum f(X-\bar{X})^2}{n}$= $\frac{54244.57}{600}$ = 90.41 (target population variance) Population Standard deviation SD=$\sqrt{\frac{(\sum(X-\bar{X})^2}{n}}$ =$\sqrt{\frac{54244.57}{600}}$ = 9.51(target population SD)

Table: 4.4 ***Calculations of representative sample of cotton farmers***

Group	Frequency (f)	Median (x)	Fx	x-$\bar{X}$	(x-$\bar{X}$)^2	f(x-$\bar{X}$)^2
18-31	71	24.5	1739.5	-11.5	132.25	9389.75
32-45	110	38.5	4235	2.5	6.25	687.5
46-60	33	52.5	1732.5	16.5	272.25	8984.25
Total	214		7705			19061.5

Source: Survey data (2017)

Mean $\bar{X} = \frac{\sum fx}{\sum f} = \frac{7705}{214}$ = 36 (sample mean)

Sample variance=$\frac{(\sum f(X-\bar{X})^2}{n-1} = \frac{19061.5}{213}$ = 89.49 (sample variance)

Sample Standard deviation SD= $\sqrt{\frac{(\sum(X-\bar{X})^2}{n-1}} = \sqrt{\frac{19061.5}{213}}$ = 9.46 (Sample SD)

Test for significance of sample size:

Hypothesis statement

Null hypothesis statement:

"There is no significant difference between the representative sample and the target population"

Alternative hypothesis statement:

"There is a significant difference between the representative sample and the target population:

Test statistic: Chi-square (N^2) = $\frac{(n-1)S^2}{\sigma^2}$

Where: n is number of groups in the sample (also degrees of freedom), $S^2$is the sample population variance and σ^2 is the target population variance.

Calculated Chi-square (N^2) = $\frac{(n-1)S^2}{\sigma^2}$ = $\frac{(2)89.49}{90.41}$ = 1.97 (P-Value)

Where: n is number of groups in the sample (also degrees of freedom), $S^2$is the sample p variance and σ^2 is the target population variance.

Tabulated Chi-square$Z^2{}_{O.O5,3}$ = 5.991

Conclusion:

Since the calculated P-Value 1.97 < 5.991 tabulated value, we get to the conclusion that there is no discernible difference involving the sample size along with the target population after failing to reject the null hypothesis. Therefore, the target population of 600 cotton farmers is well represented by the sample size 240 cotton farmers. This means that sufficient information will be provided by the representative sample concerning the target population.

Test for the significance of representative sample of links to cotton farming, to the target population of links to cotton farming

Table: 4.5. ***Calculations of target population of stakeholders to cotton farming***

Link	(x)	x-$\bar{X}$	(x-$\bar{X}$)^2
KALRO staff	5	-2.63	6.917
CODA staff	5	-2.63	6.917
Cooperative Department officers	5	-2.63	6.917
Administration Staff	5	-2.63	6.917
Agriculture Extension Staff	11	4.37	19.097
Members from existing cooperative societies	10	3.37	11.357
Male youths	10	3.37	11.357
Female youths	10	3.37	11.357
Total 8 categories	61		81.052

Source: Survey data (2017)

Mean $\bar{X} = \frac{\sum x}{n} = \frac{61}{8} = 7.63$ (target population mean)

Population variance=$\frac{(\sum (X-\bar{X})^2}{n}$= $\frac{81.052}{8}$ = 10.13 (target population variance)

Population Standard deviation SD=$\sqrt{\frac{(\sum(X-\bar{X})^2}{n}}$ =$\sqrt{\frac{81.052}{8}}$ = 3.18(target population SD)

Table: 4.6 ***Calculations of representative sample of links to cotton farming***

Link	(x)	x-$\bar{X}$	(x-$\bar{X}$)^2
KALRO staff	4	-3.57	12.745
CODA staff	4	-3.57	12.745
Cooperative Department officers	4	-3.57	12.745
Administration Staff	4	-3.57	12.745
Agriculture Extension Staff	10	2.43	5.905
Members from existing cooperative societies	9	1.43	2.045
Male youths	9	1.43	2.045
Female youths	9	1.43	2.045
Total 8 categories	53		63.12

Source: Survey data (2019)

Mean $\bar{X} = \frac{\sum x}{n-1} = \frac{53}{7}$ = 7.57 (sample mean)

Sample variance=$\frac{(\sum (X-\bar{X})^2}{n-1} = \frac{63.12}{7}$ = 9.02 (sample variance)

Standard deviation SD=$\sqrt{\frac{(\sum (X-\bar{X})^2}{n-1}} = \sqrt{\frac{63.12}{7}}$ = 3.00 (target population SD)

Test for significance of sample size:

Hypothesis statement

Null hypothesis statement:

"There is no significant difference between the representative sample and the target population"

Alternative hypothesis statement:

"There is a significant difference between the representative sample and the target population:

Test statistic: Chi-square (N^2) = $\frac{(n-1)S^2}{\sigma^2}$

Where: n is number of groups in the sample (also degrees of freedom), $S^2$is the sample population variance and σ^2 is the target population variance.

Calculated Chi-square (N^2) = $\frac{(n-1)S^2}{\sigma^2}$ = $\frac{(2)10.13}{9.02}$ = 2.25 (P-Value)

Where: n is number of groups in the sample (also degrees of freedom), $S^2$is the sample p variance and σ^2 is the target population variance.

Tabulated Chi-square$Z^2{}_{O.O5,7}$ = 14.0671

Conclusion:

Since the calculated P-Value 2.25 < 14.0671 tabulated value, we get to the conclusion that there is no discernible difference involving the sample size along with the target population after failing to reject the null hypothesis. Therefore, the target population of 61 links to cotton farming is well represented by the sample size 53 links to cotton farming. This means that sufficient information will be provided by the representative sample concerning the target population.

4.3. Profile of study

4.3.1. Objective 1: The effects of social factors: Gender, Religion, and Cultural beliefs on cotton production and development sustainability in Kisumu County, Kenya.

4.3.1.1 Gender

Questionnaire allocation concerning Gender

Considering the one-third gender rule, the study interviewed 240 cotton farmers, of whom 149 (62%) were males, and 91 (38%) were female respondents, as shown in Figure 9

below. This may also explain why many youths between 18 and 31 are not engaged in cotton farming. The youths would most likely engage in activities that give returns almost immediately with lower risks.

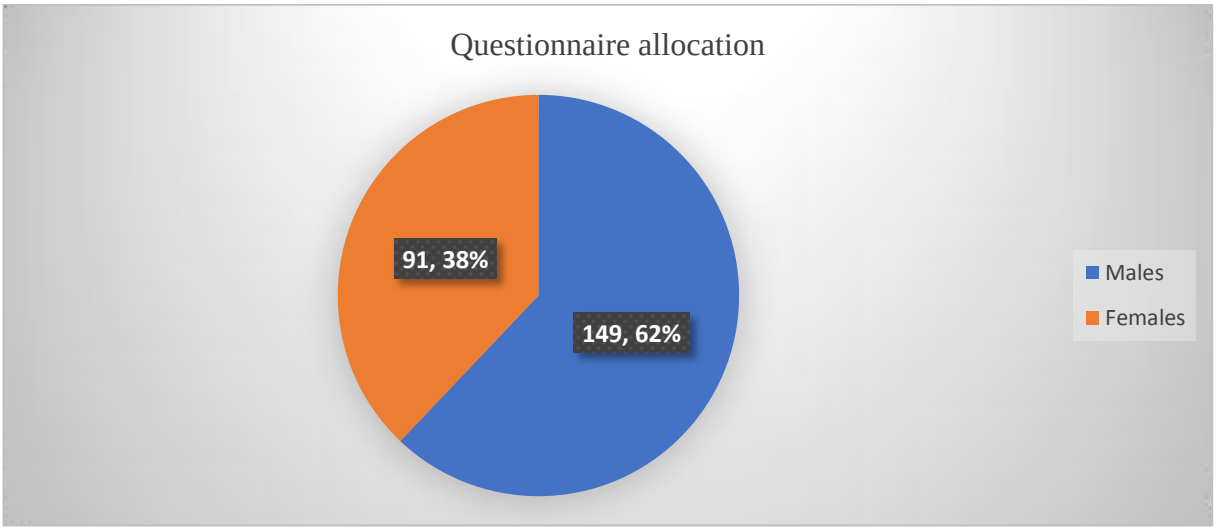


Figure 4.3: Summary of allocation of the questionnaire (Source: Survey data, 2017)

Summary of sex of respondents

The study sent 240 questionnaires to the cotton farmers and received 214. The sex of respondents with respect to the questionnaires received is outlined in Figure 4.2 below.

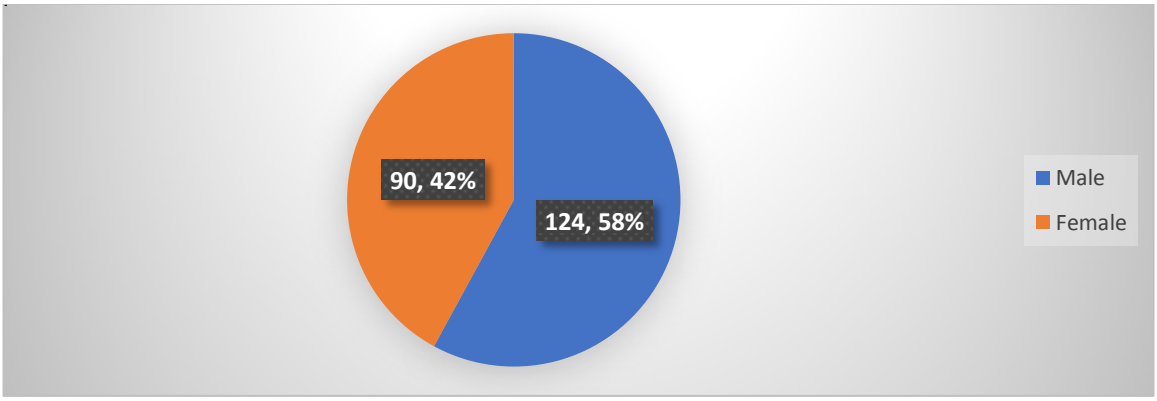


Fig 4.4 Summary of sex of respondents (Source: Survey data, 2017)

The number of male respondents was higher than the number of female respondents. One reason is that males were considered the heads of homes in most visited households. Therefore, they were allowed to provide information concerning the households. This shows that men have been ranked in the community as the ones who can give information about a home, giving less privilege to women. As such, the number of female respondents was smaller than that of their male counterparts.

Sex of Heads of Households

The study gave out 240 questionnaires to the cotton farmers and received 214. Most of the farmer households are headed by men; of the 214 questionnaires returned, 193 (90%) households visited in the study were male-headed. The remaining 21 questionnaires of the households visited (10 %) were headed by females. However, some males left the households to be headed by females as they sought paid labor in urban areas (Refer to Figure 8 below). Kenya, like any other patriarchal society, has the male Gender as the dominant decision-maker as opposed to the female Gender. In families where the man is dead, women take over the roles of both mother and father. The women, therefore, become the decision-makers in the home.

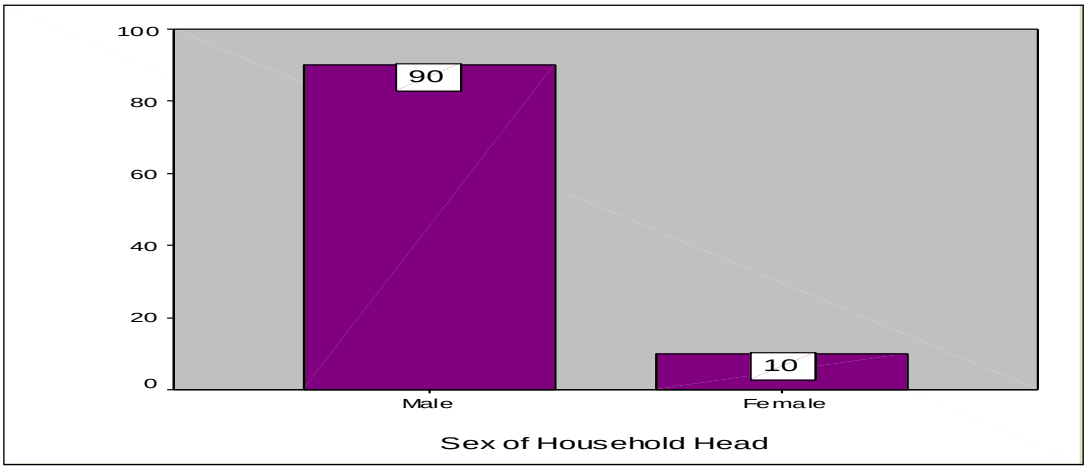


Figure 4.5: Percentage Number of Household Heads Segregated by Gender (Source: Survey data, 2017)

The men's migration from rural to urban areas may indicate that there is no reliable source of income (including cotton farming), especially for cotton farmers in Kisumu County.

Division of Labour in Cotton Production in the County

The study provided a summary of how the community under study allocates labour in crop farming to males and females, as shown in Table 4.7 below.

Table 4.7: *Gender Production Roles in Cotton*

Agricultural Crop Farming	Males	%	Females	%
Ploughing	118	55	96	45
Planting	64	30	150	70

Weeding	86	40	128	60
Harvesting	68	32	146	68
Post harvest handling	54	25	160	75
Identifying markets	154	72	60	28
Marketing	171	80	43	20
All processes	102	48	112	52

Source: Survey data (2017)

The results in Table 4.7 show that women in Kisumu County are more involved in planting, weeding, harvesting, and postharvest cotton handling. On the other hand, men are primarily involved in the stages of identifying markets and marketing. These findings are consistent with global studies such as by Knappe (2011), who discovered that women earn less than males (approximately 90% of the average male income) and do the same cotton-related tasks (picking, catering, planting, as well as field management) across areas. This may also explain the fact that the purchasing power of women is relatively compromised and emphasizes the patriarchal society in Kisumu County. Another variation of explanation may be based on the way the socialization process has been done such that women are of weaker sex and, therefore, are left with relatively less manual farm work. It was also observed that the women in this area tended to their cotton farms with their children on their backs or just around them. This implies they would have to break to attend to the

children at intervals. This further correlates to the cultural beliefs regarding gender and community management roles in this area under study. It is also noted that 52% of the women are involved in all farming processes compared to 48% of their male counterparts.

The study established that the community defines a *woman's role* as mainly raising children and managing household chores. In terms of agricultural production, women are more active in planting, managing food after harvest, and determining markets, in addition to being somewhat involved in almost every other operation. Generally speaking, males engage in more, but lesser, activities than women, such as plowing and marketing. The majority of research participants believed that women's only responsibilities were to take care of the home, raise the children, and work in agriculture. The widespread belief that a woman's labor has no value and cannot be considered a possible source of revenue for the family since it is connected to work she does voluntarily as part of her duty as a wife and mother perpetuates gender prejudice in the community.

Women in Kisumu County perform a substantial share of the work for cotton cultivation, from planting to harvesting. In contrast to males, women have fewer contracts with cotton firms, have less access to inputs and rewards from cotton production, and are not adequately represented in decision-making positions (farmers' organizations and cooperatives). This gender disparity places a burden on the cotton farming industry, the whole economy, society, and women for a variety of resources, inputs, and services, including land, labor, livestock, and financial services. Women would boost cotton farm yields by 20–30% and drastically lower the global hunger rate if they had the same access to productive resources as men (Mangieri, 2019b). In the research region, women are

generally employed alongside their husbands in cotton cultivation, hence their labor is often overlooked.

According to Venkatachalam et al. (2013), gender analysis is concerned with how gender roles and obligations vary for men and women and how these differences affect politics, the economy, culture, and society. Men and women vary significantly in terms of their quality of life, the quantity, nature, and acknowledgment of their labor, their health and literacy levels, and their social, political, and economic position. Gender is crucial to understanding societal structures and expectations, including processes for making choices and duties, how risk-loving members are, and their rights to advantages resulting from technology advancement, claim Santosh Behera and Prasad Mohapatra (2016). The social relations of gender include all facets of social interactions, with a focus on the use of power, distribution of money, control over resources for production, and compensation for labor, as well as participation in cultural and religious pursuits.

The research demonstrated that although women and girls offer important labor input to most parts of the cotton production cycle, they are usually unpaid family workers or low-paid day employees. When this happens, people often carry out demanding duties. It was determined that children assisted their moms in the agricultural process of cultivating cotton, mostly by picking cotton. International standards may not allow this, depending on the age of the kid and the nature of the activity (mostly if it impacts the child's health, development, and education) (I.L.O. et al.).

In most communities, the guy takes care of the family's needs. According to societal norms, some women assert that males and/or husbands play the function of "security" in their houses. Among other things, he is held accountable for overseeing agricultural operations

and ensuring the family's safety. None; instead, women may become more involved in cotton production as managers of farms as a result of the feminization of overall agriculture as well as the cultivation of cotton, which is sparked by men's growing participation in off-farm activities.

Hypothesis testing

Test for significance of gender as a socio-economic factor affecting sustainable cotton production in Kisumu County:

Table 4.8: ***Calculations for Gender Production Roles in Cotton***

Cotton input Farming	Male	x-$\bar{X}$	(x-$\bar{X}$)^2	Female	x-$\bar{X}$	(x-$\bar{X}$)^2
Ploughing	118	16	256	96	-16	256
Planting	64	-38	1444	150	38	1444
Weeding	86	-16	256	128	16	256
Harvesting	68	-34	1156	146	134	17956
Postharvest handling	54	-48	2304	160	48	2304

Identifying markets	154	52	2704	60	-52	2704
Marketing	171	69	4761	43	-69	4761
All processes (7)	715	11881	7120	783	99	29681

Source: Survey data (2017)

Mean $\bar{X} = \frac{\sum x}{\sum f} = \frac{715}{7}$ = 102 (mean of males in total farm input in 7 processes)

Mean $\bar{X} = \frac{\sum x}{\sum f} = \frac{783}{7}$ = 112 (mean of females in total farm input in 7 processes)

Variance=$\frac{(\sum (X-\bar{X})^2}{n-1} = \frac{11881}{102}$ = 116.48 (variance of male farm input)

Variance=$\frac{(\sum (X-\bar{X})^2}{n-1} = \frac{29681}{112}$ = 265.00 (variance of female farm input)

Standard deviation SD= $\sqrt{\frac{(\sum (X-\bar{X})^2}{n-1}} = \sqrt{\frac{11881}{102}}$ = 10.79 (male farm input)

Standard deviation SD= $\sqrt{\frac{(\sum (X-\bar{X})^2}{n-1}} = \sqrt{\frac{29681}{112}}$ = 16.28 (male farm input)

Let $\mu_1$and μ_2 be the means of the female and male involved in cotton farming process which affirms that Gender has effects on sustainable cotton production in Kisumu County

Hypothesis statement

Null hypothesis statement:

$H_O: \mu_1 - \mu_2 = 0$

Alternative hypothesis statement:

$H_i: \mu_1 - \mu_2 > 0$

Test statistic: We reject if $Z > Z_{0.05} = 3.7870$

Where: $\bar{X}_1$ and $\bar{X}_2$ are the means of female and male mean respectively, 7 is the number of farm production processes (also degrees of freedom) for both female and male, S_1 and S_2 are the female and male farm input standard deviations and n_1 and n_2 are the number of females and males involved in all processes of farm input

Compute: (Z –Value) = $\frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{{S_1}^2}{n_1} + \frac{{S_2}^2}{n_2}}} = \frac{112-102}{\sqrt{\frac{16.28^2}{112} + \frac{10.79^2}{102}}} = \frac{10}{1.87} = 5.33$

Conclusion*:*

Since the computed Z –Value 5 is greater than the 3.780 tabulated value, we reject the null hypothesis and conclude that there is a significant difference in the means of males and females involved in cotton farming processes. The females have a significant input in cotton production and are highly involved in most processes. Therefore, this confirms that gender affects sustainable cotton production in Kisumu County.

4.3.1.2 Religion and Cultural beliefs

The degree to which cultural practices influence cotton production in the County can be summarized in Table 4.10 below. Female farmers were the most affected by cultural practices compared to their male counterparts.

Table 4.9 ***Degree of Socio-Cultural Influences on Cotton Production***

Practice	Female				Male			
	Yes		No		Yes		No	
	No.	%	No	%	No.	%	No.	%
Religious affiliation	63	70%	27	30%	78	63%	46	37%
Behavior patterns	36	40%	54	60%	87	70%	37	30%
Wife Inheritance	71	79%	19	21%	103	83%	21	17%
Apathy	50	55%	40	45%	81	65%	43	35%
Early Marriages	51	57%	39	43%	98	79%	26	21%
Gender-based Violence	54	60%	36	40%	67	54%	57	46%
Retrogressive Cultural Practices	74	82%	16	18%	109	88%	15	12%

Source: Survey data (2017)

The above data can also be presented in proportionate form, as in Figure 4.11 below. Retrogressive cultural practices influence the role of the male gender in cotton production more than the female gender (88%).

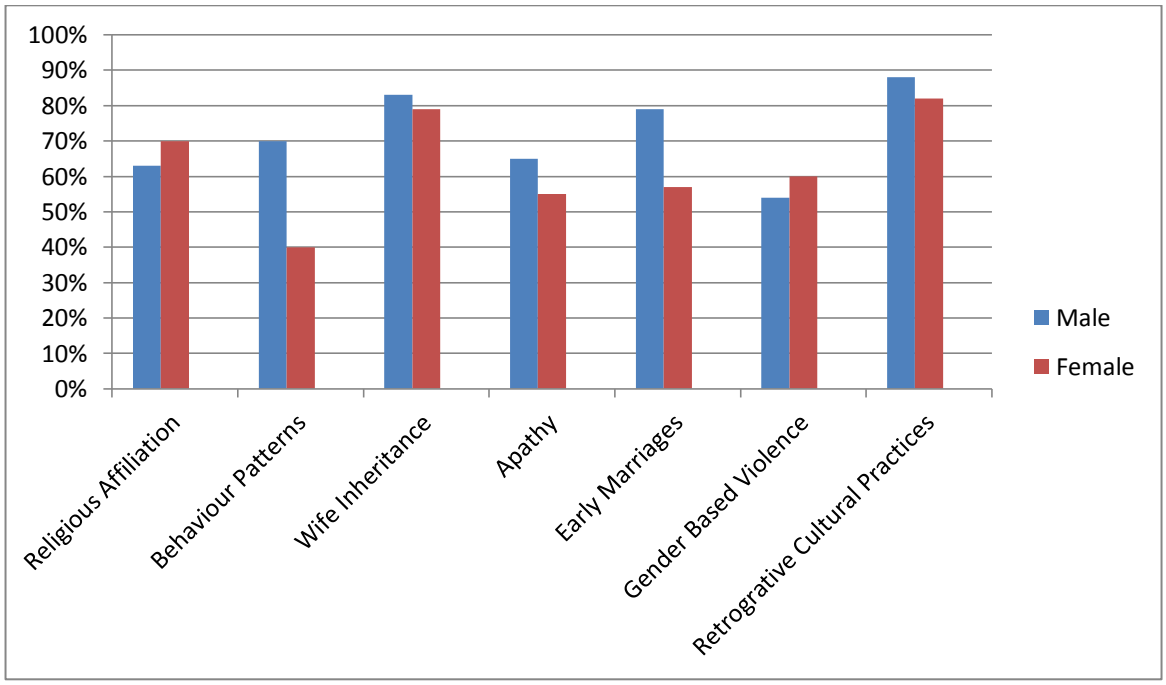


Figure 4.6 Percentage Socio-Cultural Influences on Cotton Production (Source: Survey data, 2017)

This may imply that the men uphold or are the symbol of cultural practices in Kisumu County. It has long been known that women, young people, and people with disabilities are structurally excluded due to the persistence of outdated cultural norms and beliefs. Women have suffered because of beliefs and customs such early marriages, wife inheritance, along with violence based on gender.

The study further established from the 60 % of female respondents that gender-based violence was still at its high in Kisumu County. This is an indicator that interventions targeting gender-based violence and related early marriages need to review programming strategies in Kisumu County. If such interventions are effective structurally, then the above results indicate that many gender based violence cases go un- reported for varied reasons. This could be an area for further gender studies in Kisumu County.

The majority of farmers who deal with issues in agriculture are small-scale operators with dispersed tiny areas. For each crop season, producers typically either lease the property or work together with the landowner. When landowners do not reside there, they lease the property out and impose strict terms on tenants. In many cases, the other production factors—such as contemporary technology, financing availability, and a cooperative mind-set—do not exist.

According to Agana (2012), land is traditionally seen as a source of power, authority, and identity to the community, clan and family as well as the individual. The study established several reasons that made it difficult for women to own land in the County from the Focus Group Discussions *Land Ownership is a retrogressive cultural practise that has been practised for decades in Kisumu County*. Land is inherited from parents and is only given to the male children. This makes it impossible for female children to own land.

Although to varying degrees, both men and women are impacted by access to land. However, since they do not have any long-term rights to the land, women who own little amounts of land feel insecure and are less inclined to actively engage in the decision-

making processes around agricultural production. On the other hand, males possess the ability to make choices in their capacity as owners and may easily modify agricultural goods. Because males often possess the collateral assets, women also have a very hard time getting access to input credit facilities.

Land access, control, and ownership for women are restricted by customary laws, as well as by behaviors and attitudes that uphold women's subservience to males. In Kisumu county, and whether schooled or uneducated, women lack equal opportunities to access, inherit and purchase land in contrast with males. Married women's spouses provide them with access to land for farming. They are not allowed to inherit the land under customary law, but they are allowed to utilize it in the case of a divorce or widowhood. The gender roles which society assigns to men and women are the source of these circumstances. Property owners are seen as forceful, hard to manage, and often rule-breakers, making them unfit for marriage. However, males have more authority over land compared to women do, a position that is heavily impacted by customary definitions of land ownership rights. The majority of land is owned by lineages, clans, and families, and males are often attributed with power over it by their bloodline or the heads of clans.

This study summarized the proportionate responses in table 11 below. The results on table 8 below cannot emphasise the foregoing texts on effects of socio- cultural practices on gender roles in cotton farming in Kisumu County. Retrogressive cultural practices may result into traditions that do not favour women in the area as shown by 82% female respondents.

Table 4.10 ***Situations that make it difficult for women to own land***

	No	Percent Respondents (%)
Women lack interest	4	5
Women are not aggressive	3	3
Change of technology	7	8
Purchase of land is expensive	30	33
Discrimination Traditions	46	51
Total	90	100%

Source: Survey data, 2017

As previously mentioned, these factors may entrap women in a detrimental cycle of dependency and poverty, adversely affecting their capacity to acquire land. This elucidates the rationale behind 46% of female respondents being unable to acquire land due to its prohibitive cost. The 1% rationale for technological change suggests that the cotton production methods in Kisumu County are primarily rudimentary or traditional, or that there is a complete lack of cotton production technology in the examined region. The absence of assertiveness among the women, as reflected in the responses, might also be

attributed to regressive cultural traditions that inhibit women's responsibilities in agriculture, particularly in cotton production. Empowerment and evolving lifestyles have led to a shifting mentality in which women and certain children are now considered beneficiaries of inheritance, as demonstrated by the study. The research found that numerous small farmers are apprehensive about utilizing their title deeds as collateral for loans. Despite the significant value attributed to land, it serves as a source of familial security for small-scale farmers. It should not be leveraged for loans aimed at enhancing agricultural productivity. In a focus group discussion, a respondent stated, "Everyone is apprehensive about relinquishing their title deeds." The historical availability of financing via title deeds instills fear in farmers, as many have lost their land. We favor alternative methods, such as cooperative savings and equity acquisition. Many women have invested here and can obtain loans utilizing those shares.

4.3.2 Objective 2: Economic factors;

Marketing and Distance from buying centers on the sustainability of cotton production and development in Kisumu County, Kenya.

The study involved other respondents to get more information on the cotton market and its effects on sustainable cotton production. The respondents were linked to cotton farming. Other than the cotton farmers themselves, involving the links helped the study gain more information on the status of cotton markets from way back in recent years up to the current time of the study.

4.3.2.1 Marketing

Cotton value chain

The cotton value chain involves several stages, from cotton production until it is converted into a finished good. The stages in the cotton value chain are outlined in Figure 4.7 below.

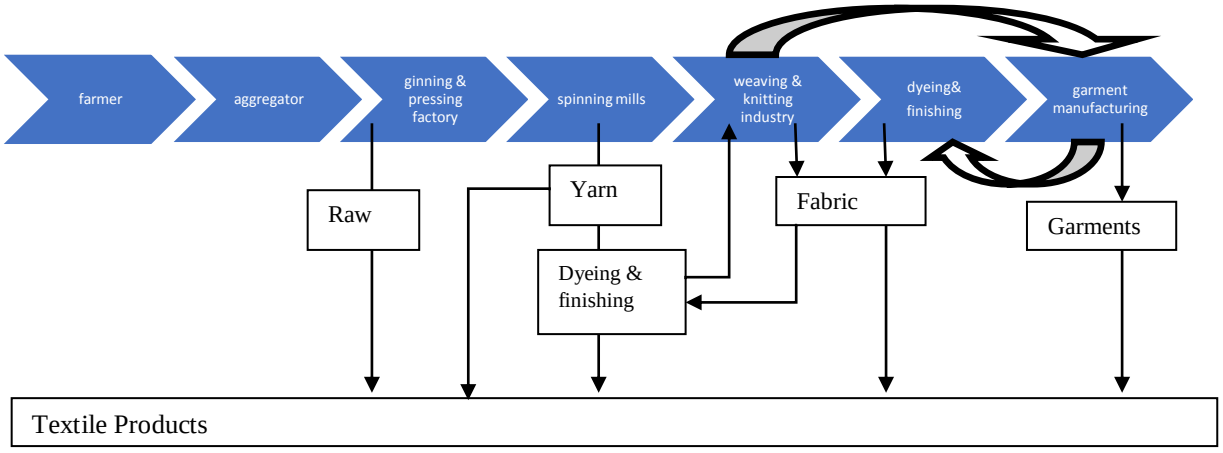


Figure 4.7: Cotton value chain (Source: Adopted from World Wide Fund, 2012)

At each point, all the players involved in the cotton value chain market determine the success of cotton production right from the ground. Marketing is the process of promoting a business by creating, communicating, convincing a customer, delivering and exchanging valuable products with customers, clients, and partners who may further convert it to a different product for use. All these value chain processes take place within a market. Without a market, there will be no sale of product; hence, the production of that particular product will also be affected. The market itself and access to the market play a big role in all stages of the cotton value chain. As such, the study saw it a necessity to determine how

market and distance from buying centres influenced sustainable cotton production in Kisumu County.

The figure 4.8 below gives a detailed breakdown of all the players involved in the cotton value chain at each stage of the value chain with respect to the market and market access.

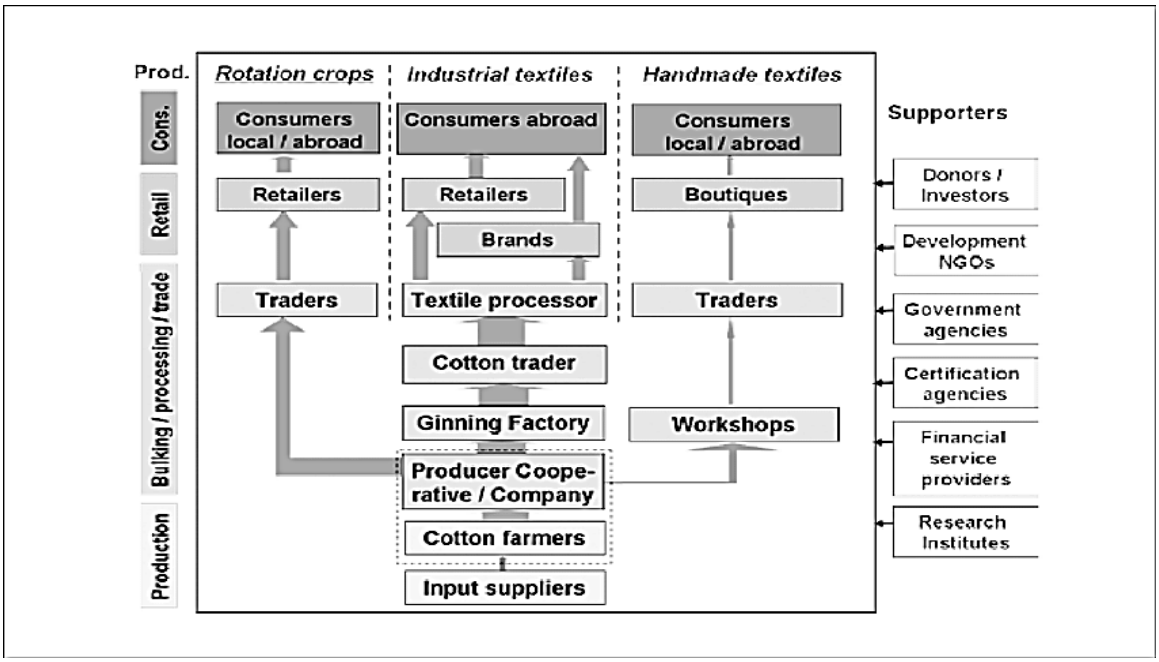
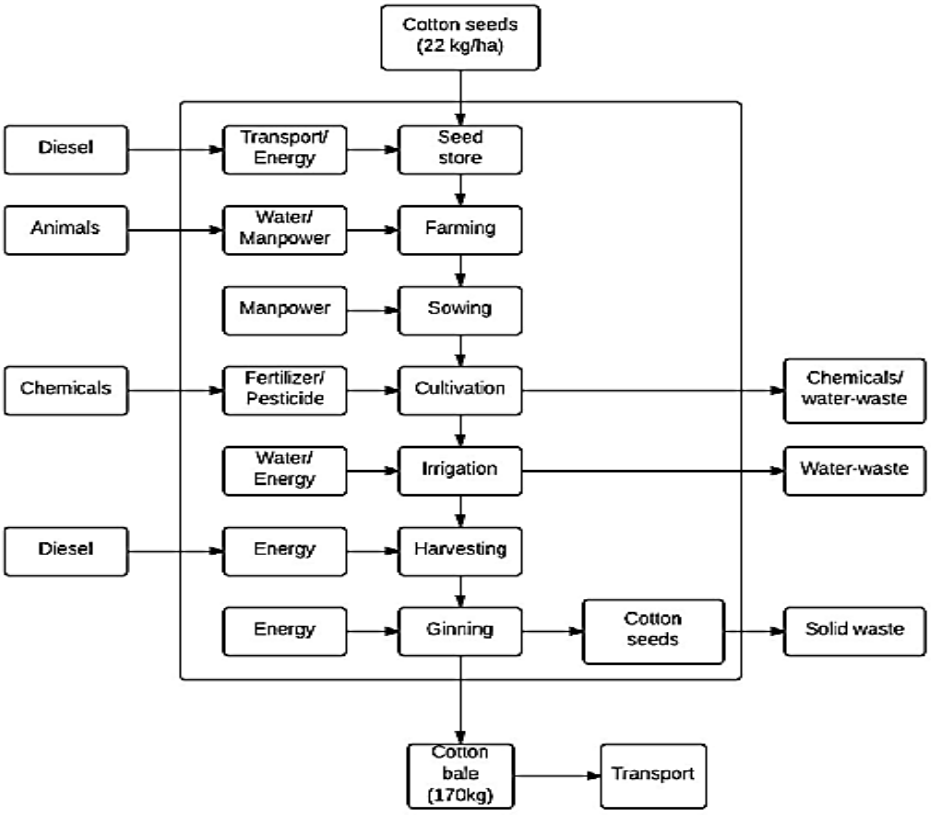


Figure 4.8 Cotton value chain players (Source: Adopted from World Wide Fund, 2012)

The involvement of the agriculture extension staff, officers from the cooperative societies, members from the cooperatives, KALRO staff, CODA staff administration staff and youths in the study captured all the players involved in the cotton market. Since the market also makes it possible for the availability of input supplies to cotton farming and selling of cotton products, the table below gives an outline of inputs and output of cotton farming.

Table 4.11: ***Cotton inputs and outputs***



Source: Adopted from World Wide Fund, 2012

The study found out the market was a key player in ensuring sufficient supply of inputs for cotton farming. The price of these inputs determined how much cotton a farmer was able to produce. The producer hypothesis provided support for this idea. The conduct of businesses in recruiting and combining productive resources to deliver goods at reasonable

prices is the focus of the producer's theory. This process involves two sets of issues: the institutional framework, which includes the features of the market where inputs plus consumables are bought and sold, and the technological restrictions, which restrict the spectrum of possible productive processes (Just & Pope, 2001). This study summarized the proportionate responses in the table below.

Table 4.12: ***Responses from Actors/Stakeholders***

1.Input supplies	Market costs			
	Cotton farmers		Stakeholders	
	Affordable	High	Affordable	High
Cotton seeds	22 (10%)	192 (90%)	8 (15%)	45 (85%)
Fertilizers	8 (4%)	206 (96%)	15 (28%)	38 (72%)
Pesticides	12 (6%)	202 (94%)	13(25%)	40 (75%)
Technology	6(3%)	208 (97%)	5 (9%)	48 (91%)
Capital	10 (5%)	204 (95%)	3 (6%)	50 (94%)
2. Land size	less than 1 acre		More than 1 acre	
Cotton farmers	208		6	

3. Support	Cotton farmers		Stake holders	
Those who are members of a cooperative	88 (41%) Yes	126 (59%) No	13 (34%) Yes	40 (66%) No
Where does farmer support come from?	Cotton farmers response (Total 214 respondents)			
	Cooperative	Self	NGO	Government
	88	116	6	4
Who does the marketing of the cotton produced and cotton products	Cotton farmers and stakeholders response (Total 267 respondents)			
	Cooperative	Self	NGO	Government
	101	144	14	8
	Cotton farmers and stakeholders response (Total 267 respondents)			
4. Is distance from buying centres a challenge	243 (91%) Yes		24 (9%) No	

Source: Survey data 2017

The study also assessed the marketing variable consisting of Exchange relationships determined in market, Attention to Marketing products is a core function, and Products advertised.

4.3.2.2 Distance from buying centers

Distance is measured using three dimensions: preference for a closer location to industry, our location influencing our site, and location determining our economic activity.

4.3.2.3 Income Generating Activities

According to the survey, among other kinds of money-generating activities, farming accounted for the majority of respondents' sources of income (88%) followed by casual labor (6%) and informal employment. In the course of a "Key Informant Interview," a male participant shared the following insights;

When we saw that the majority of kitchenware and house furnishings are purchased with "chama" money, we first questioned why women still engage in gossip under the guise of "chamas." We eat healthier food and the kids have better clothing, but I'm not sure how much my wife saves with the "chama." I sometimes even receive a little amount of money for personal usage! Additionally, he said that;

"A lady is no longer seen as belonging to her own family when she is married.A man, on the other hand, is unaffected by his surroundings; he may return home with his kids after leaving the town or the village and still be the land's heir". The extension staffs, who are the agricultural officers, had this to say;

"The farmers might be intrigued by extension services, but we have limitations in that aspect because it takes a very small number of staff to get to all of these farmers."

Respondents' main income generating activities were summarized in table 4.5 below. It was determined that even though both men and women engage in income-generating activities, the kinds of income-generating activities that men and women engage in differ.

Table 4.13: ***Respondents' Main Income Generating Activities***

ACTIVITIES	No.	Percentage (%)
Farming	212	88%
Informal employment/Wage labour	15	6%
Casual labour/piecework	7.0	3%
Trading/Selling business/Shop/Market	2.0	1%
Skilled artisan	2.0	1%
Selling firewood/charcoal/timber	2.0	1%
Others	0	0%
Total	240	100%

Source: Survey data, 2017

Considering the various factors that affect general value of agricultural products, the high reliance on farming income indicate that poverty level in Kisumu County remains considerably high. The area's main cash crop is cotton which seems to fetch a considerably low economic value to be categorised as a sustainable source of income. Other factors that may explain this reliance on farming income is lack of industries and low levels of entrepreneurship skills among individuals who attained tertiary and above levels of education.

It was observed that a greater number of males than women are pursuing official or informal employment. A greater number of males are involved in sophisticated artistic endeavors. It's interesting to see that more women are showing interest in selling lumber, firewood, and charcoal. This can be the case since such activities are easily integrated close to residential areas, allowing women to attend to other household chores as well.

4.3.3 Objective 3: Interventions on sustainable cotton production

Millions of people might escape poverty via sustainable cotton's ability to provide better working conditions and a more steady income. For smallholders, cotton is a crucial crop to rotate for food, fuel, and fiber (like cotton seed oil), and the monetary revenue it produces is essential for raising living standards. The growing need for food, water, and energy due to the projected 9 billion people on the planet by 2030 will make many crops—including cotton—unfeasible. There will be additional pressure to shift land usage from fibers, like most cotton cultivation, to food and fuel as demand for food might climb by 40%, for water by 35%, and for energy by 50% or more (Shelton & Wachter, 2015).

Table 4.14: ***Responses from Actors/Stakeholders***

Support (interventions)	Cotton farmers		Stake holders	
Those who are members of a cotton farmer group	88 (41%) Yes	126 (59%) No	13 (34%) Yes	40 (66%) No
Where does farmer support come from? (Fertilizer, seeds, chemicals, extension services etc)	Cotton farmers response (Total 214 respondents)			
	Cooperative	Self	NGO	Government
	88	116	6	4
Who does the marketing of the cotton produced and cotton products	Cotton farmers and stakeholders response (Total 267 respondents)			
	Cooperative	Self	NGO	Government
	101	144	14	8
	Cotton farmers and stakeholders response (Total 267 respondents)			

4. Is distance from buying centres a challenge	243 (91%) Yes	24 (9%) No

Source: Survey data 2017

The above table shows that the government interventions are not reaching out to the cotton farmers. These challenges include: low and unreliable rainfall and high pest incidence; lack of affordable credit to purchase inputs; low cotton yields as a result of poor quality seeds, untimely land preparation, poor pest control and inadequate use of fertilizer and manure; unstable cotton prices; inadequate availability of certified seeds, and; weak farmer organisations. In addition to that, the farmers lack government extension services.

Table 4.15: ***Responses from Actors/Stakeholders in cotton production***

	Stakeholder	Problem	Intervention
1.	KALRO Staff	Lack of quality/pure seed	Seed bulking being done at KALRO and advocates for use of BCI Better Cotton Initiative Researcher interventions should be funded by government and be enacted.
2.	Agriculture	Small land size, planting	Promote pure stand cotton farming,

	extension staff	cotton with other crops Mixed farming where cotton is planted late after weeding and poor crop management practices	early planting of cotton at the onset of rains and adoption of modern cotton production techniques.
3.	Administration officers- Chiefs	Farmers left cotton for other crops due to small land size, poor and low yields,poor marketing strategies and low returns.	Cooperative societies to enact laws that favour farmers, remove middlemen, streamline marketing strategies and pay farmers appropriately and on time.
4.	Youth	They don't own land to give them the morale to work, so their work is not valued and are not rewarded after payments. Their work is seen as a right by the parents.	Allocation of some land for farming by parents, their work to be valued and be rewarded after payments. Government should subsidise prices on the cost of seeds and offer extension services.
5.	Cooperatives officer	Weak cooperative societies	Need for proper elections and strengthening of the existing cooperative societies.
6.	CODA staff	Reluctance of farmers to take	Have demonstration plots in cotton

		up new technologies	growing areas.
7.	Cooperative societies	Lack of quality seed which comes late and not easily accessible. No guaranteed markets, fluctuation in prices with season having new players and new prices. Lack of credit support to farmers particularly in pest and disease control, thus farmers developed a negative attitude towards cotton production.	Make cotton farming a legal contract with necessary support from the government and other stakeholders in the cotton apparel value chain. Install a community ginnery to guarantee a steady market, good prices and pure seed supply to address the negative attitude so that farmers can increase cotton acreage, increase yields and grow cotton meaningfully.

Source: Survey data (2017)

4.3.3.1 AGOA initiative

The AGOA initiative-imposed export restrictions of 1.5–3.5% on the whole U.S. apparel market. By December 2001, the AGOA-designated sub-Saharan countries collectively provided fewer than 20% of the export quota. This is the paramount investment potential

for Sub-Saharan Africa to produce garments for export to the United States under AGOA. The textile sector is presently functioning at 30 to 40% capacity utilization. In the early 1990s, prior to the deregulation of the cotton business, cotton was the predominant cash crop in the lake region and played a significant role in the education of many prominent individuals in the country today. The circumstances have changed (Ministry of Industrialization Report, 2013). This study aimed to identify the factors that contribute to this condition. The study conducted a market assessment of cotton and its products in Kisumu County. It incorporated a value chain analysis (VCA), which established a framework for developing a strategic plan to increase the value and volume of cotton marketed in Kisumu. The multi-fiber arrangement (MFA) replaced both the trade in cotton textiles (STA) and the long-term arrangement (LTA) that existed from 1963 to 1973. FA). The MFA was extended five times and ultimately concluded in 1994 with the Agreement on Textiles and Clothing (ATC) introduction. These agreements limited the volume of trade. They did not comply with the current GATT regulations. Consequently, WTO regulations do not govern this sector. The global trade of textiles and apparel exports reached £304.0 billion in 2001. China's clothing exports increased fourfold from 1990 to 2002 (International Trade Centre-Geneva 2001). The Kenyan government does not provide subsidies for cotton cultivation and ginning. The government does not provide price assistance for producers or promote cotton products. The government offers targeted assistance to smallholder farmers through the provision of planting seeds and complimentary consultancy services. Cotton cultivation in Kenya has provided sustenance for farmers, particularly in the ASAL regions. It serves as a source of household income and is crucial for alleviating poverty and providing food security. The peak lint production

for 51,000 bales occurred in 2006. This peak coincided with the establishment of the Cotton Development Authority (CODA) in 2005, during which there was significant government capital infusion. Nevertheless, in 2007, production began to decline, reaching its nadir of 21,300 bales in 2010 (Table 2.1) despite producing the highest amount of seed (Israel, 1992).

Table 4.16: ***Cotton Production in Kenya, 2005 – 2011 in Hectares***

Year	2005	2006	2007	2008	2009	2010	2010/11
Area (Ha)	32357	36277	35929	43035	39963	20553	32240
Production of seed (tons)	19414	22492	24933	15093	14886	11822	22000
Cotton lint (bales)	23000	51000	45000	27000	26821	21300	39639
Price of seed cotton (KSh/Kg)	20	21	20	22	26	48	65
Yields (Tons/ha)	0.6	0.6	0.69	0.35	0.37	0.58	0.68
Value of seed cotton (Million Ksh)	388	472	1250	332	387	567	1430

Source: Cotton Development Authority, 2012

The 2012 status report from the Cotton Development Authority said that Kenyan cotton growers faced a number of difficulties. Low and inconsistent rainfall, a high frequency of pests, a lack of credit that is affordable to buy inputs, low cotton yields due to subpar seeds, delayed land preparation, ineffective pest control, alongside insufficient use of manure and

fertilizer, unstable price tags for cotton, a lack of certified seeds, as well as an inept farmer organization are some of these challenges.

4.3.3.2 Research interventions

In 1970, a significant issue about seed distribution emerged in Nyanza. Regions cultivating BP52 transitioned to UKA59/240 (cotton seed cultivars). The reason for this shift was a shortage of pure seed. Researchers recommend planting each type as a pure stand to avoid seed contamination in subsequent plantings. Regions such as Kendu-Bay, Homa-Bay, and Kibos Zones were required to cultivate both types. The mixing of seeds exacerbated the seed scarcity, resulting in an insufficient supply of pure seeds for planting in consecutive seasons. Nyanza did not distribute cotton seeds gratuitously in 1971; instead, they imposed a fee of Shs 5.00 per packet, sufficient to cultivate only 0.4 hectares. The majority of farmers lacked financial resources and were consequently provided loans by their cooperative unions (Kennedy, 1964). Aldington (1971) also ascribed the inadequate performance of Kenya's cotton industry to prevailing husbandry standards and the prices provided to farmers, leading them to perceive cotton as an unprofitable crop to cultivate. This is about the "phenomenon that illustrates the evolving economic interconnections among diverse outputs on multiproduct peasant farms, demonstrating the production responses of cotton farmers to the relative prices encountered, taking into account the different marketing opportunities available" (FAO, 2007).

Enhancement of crops

The revitalization of the cotton sector necessitates the availability of high-quality, high-yield cotton types. Preserving the genetic integrity of newly introduced, promising, and established commercial cotton varieties is a crucial technique that guarantees the longevity of all varieties and cultivars. We are acquiring new types and choosing the best characteristics. The acquisition of new varieties, along with their characterization, evaluation, and propagation, provides the breeder with an extensive foundation for selecting superior kinds. Direct acquisition or selection from specimens preserved at the National Gene Bank of Kenya (NGBK) accomplishes this.

4.3.3.3 Government interventions

The supply of certified cotton seeds

The government intervened by pledging to supply BT cotton seeds to farmers. The government aimed to supply cotton farmers with approved seeds to enhance crop productivity and stimulate the textile sector. Alfred Busolo, Director-General of the Agriculture, Fisheries, and Food Authority, stated that the aim is to facilitate the country's utilization of the African Growth and Opportunities Act (Agoa), which permits indigenous apparel to reach the American market duty-free. Growers in cultivation areas received approximately 750 tons of cotton seed (Chemengich, 2010). He made these remarks at a fiber conference at Utalii College in Nairobi, pointing out that Table 4.7's findings show that women in Kisumu County are more involved in the stages of planting, weeding, harvesting, and post-harvest handling of cotton. Conversely, men predominantly participate in phases of market identification and marketing. These findings align with global research,

including Knappe (2011), which indicates that women engage in similar cotton-related activities throughout locations (picking, catering, planting, and field management) and receive lower compensation than males, earning approximately 90% of the typical male income. This may shed light on the reduced purchasing power of women, thereby highlighting the prevalent patriarchal structure in Kisumu County. The socialization process, which positions women as the weaker sex and relegates them to comparatively less strenuous agricultural labor, may also contribute to the observed differences. The ladies in this region manage their cotton crops with their children on their backs or nearby. This necessitates that they take breaks periodically to care for the youngsters. This further correlates with the cultural attitudes around gender roles and community management duties in the area under investigation. 52% of women participate in all agricultural processes, compared to 48% of their male colleagues.

The research determined that a woman's position in the community is predominantly characterized by childrearing and household management. Women play a significant role in agricultural productivity, engaging primarily in planting, post-harvest handling, and market identification while also participating, to varying degrees, in all other activities. Men participate more in plowing, marketing, and other activities, albeit to a lesser extent than women. Most participants in this study believed that women's primary responsibilities were household upkeep, childcare, and participation in agricultural production. The community's prevailing belief undervalues and disregards a woman's labor as a viable source of family income, perceiving it as intrinsic to her roles as a wife and mother, thereby demonstrating gender bias. Women in Kisumu County contribute significantly to the labor in cotton

cultivation, encompassing all stages from planting to harvesting. However, they lack sufficient representation in decision-making positions within farmers' associations and cooperatives, have fewer contracts with cotton firms than men, and have less access to inputs and production revenues. The gender disparity persists across various assets, inputs, and services—such as land, livestock, labor, and financial services—resulting in costs to the cotton farming sector, the wider economy, society, and women. Women could significantly reduce global hunger by 20–30% if they had equal access to productive resources as men (FAO, 2011). In the studied area, women's contributions to cotton production, alongside their husbands, frequently remain unacknowledged. Gender analysis examines women and men's distinct roles and duties and their impact on society, culture, the economy, and politics (Reeves and Baden, 2000). Significant disparities exist between women and men regarding quality of life, the quantity, nature, and acknowledgment of their work, health and literacy levels, and their economic, political, and social status. Moock (1986) asserts that gender is essential for comprehending social structures and expectations, including decision-making processes, duties, societal risk tolerance, and rights to advantages from technical advancements. The social relations of gender encompass all facets of social interactions, particularly focusing on the exertion of authority, access to, and control over resources for production, income distribution, compensation for labor, and cultural and religious practices. The study determined that, although women and girls contribute significantly at many stages of the cotton production cycle, they are often unpaid household laborers or receive minimal compensation as day laborers. In such instances, people frequently perform arduous duties. Research has shown that children and their mothers primarily provide labor in cotton cultivation by picking cotton. Depending on the

child's age and the activity's nature (especially its impact on the child's health, growth, and education), this may not conform to international standards (ILO Core Conventions). Regressive cultural traditions that inhibit women's agricultural responsibilities, particularly in cotton production, may also be to blame for the women's lack of assertiveness, as reflected in their responses. However, the survey reveals a shifting perspective, where empowerment and evolving lifestyles increasingly view women and confident children as integral to inheritance. Demands for specific initiatives that address women's unequal access to resources, decision-making opportunities, and equitable compensation, particularly in Kisumu County, mitigate the ongoing discrepancies in cotton agriculture between men and women. This solution to inequality will significantly improve agricultural output and household earnings. Women's empowerment via education, access to credit, and involvement in cooperatives will augment their negotiation leverage for improved market conditions and increased control over cotton production revenue. Moreover, harnessing the complete potential of women in agriculture may enhance economic growth, mitigate poverty, and advance global goals in food security.

Exorbitant taxation on cotton cultivators.

Mr. Busolo stated that, as firms producing for export within the Export Processing Zones must pay import tariffs, only the wages disbursed to Kenyan operators and workers contribute to Kenya's value addition in the fiber conversion production system. "This deprives Kenyan cotton producers and processors of the complete advantages of the Agoa arrangement," he stated. Sicily Kariuki, the Principal Secretary for Agriculture, stated that

the EPZA imports approximately 50 percent of its lint, despite a 28 percent increase in profits from Sh20.5 billion in 2008 to Sh26.4 billion in 2012.

Cotton Amendment Legislation

The Cotton Amendment Bill 2006 established the legal framework for government-supported reorganization of the cotton sector. National production increased from 5,090 metric tons in 2005 to 9,800 in 2006. This increase was primarily attributable to a rise in the number of producers (hectares cultivated) rather than a significant enhancement in output. Average yields persist at 400–600 kg/ha of seed cotton (Chemengich, 2010).

Ensure that the farmer receives extension messages on ICM.

The Extension Services (Ministry of Agriculture) and the Cotton Development Authority (CODA) acknowledged the necessity and significance of advancing Integrated Crop Management (ICM) through demonstration plots; however, they have thus far been unable to execute this approach due to insufficient capacity. One limitation was the availability of current technical packages for managing cotton crops and pests. Furthermore, national agricultural research organizations often lack alignment with the needs of the ginning industry, and inadequate extension services hinder their ability to disseminate technical information to a substantial number of farmers (Olweny-CODA & Karuiki, n.d.). Significantly more efforts are required to enhance public/private partnerships to meet the interests of all stakeholders in the value chain.

Translating research findings to agricultural practice

Enhancing on-farm demonstration (OFD) programs through farmer participatory training and advocating for scientifically grounded Integrated Crop Management (ICM) systems that are suitable and acceptable to smallholder cotton producers could mitigate several limitations in disseminating research findings to farmers while also fostering connections among all key stakeholders, both private and public. A connection must exist between developing novel techniques and approaches and their dissemination to end users, specifically farmers (Olweny-CODA & Karuiki, n.d.). Consistency of ICM (Improved Crop Management) package

There is a chance to provide better technical services in situations where there is some vertical incorporation of the commodity chain, such as when ginning corporations supply cotton farmers with agricultural inputs or when a codified "contract farming" system is in place. Making inputs accessible to farmers hasn't proven to be enough to dramatically increase yields. (BROWN, K.J. and ANTHONY, K.R.M. (1970), n.d.). The component that is lacking is a unified ICM package that acknowledges the limitations faced by the farmers and is supported by technical training associated with a pilot project.

The need for technical and institutional innovations

Funding as well as private incentives are needed for institutional and technical advances in the cotton industry. This is particularly valid for creating and propagating new cultivars, enhancing pest control, and modernizing grading schemes. Achieving a balance of public as

well as private engagement will also be necessary, as will talking with all relevant parties to create institutional and regulatory frameworks that support technology renewal.

Risk aversion by the private sector and farmers

Prior to structural adjustment, state or parastatal entities controlled the integration of production-to-market chains for agricultural products. These organizations not only bought the commodity from farmers but also supplied subsidized farm inputs, advisory services, and occasionally even credit. The government has, however, stopped supporting the input and output markets as a result of the structural adjustment policies, with the hope that private sector merchants would fill the void and grow these markets. In reality, it has shown that the private sector is quite reluctant to take on risk when it comes to funding smallholder agricultural businesses that cultivate cotton. Because cotton needs more crop protection and fertilizer than food crops, farmers will allocate less resources to these tasks.

Policy issues

Policy issues further complicate the situation, including price regulation for seed cotton, subsidies for inputs, and access to input credit. Cotton farmers exhibit significant price sensitivity; however, efforts to regulate prices may deter private sector investment in production support mechanisms. Primary and foundation seeds are produced annually. We have already produced 100 tons of certified HART 89M seed in the 2009/2010 season. Smallholder cotton growers require access to certified seeds, equitable price regulation, and

sustainable input subsidies to improve productivity. If effectively utilized, these elements will ensure market stability and promote private sector investment in agricultural support systems and loan accessibility.

Farm factors

Farm factors are assessed through three dimensions: the number of personnel sufficient for duties, assets relative to our costs, and the substantial local market share held. Additional variables in agricultural factors encompass cotton acreage, cotton production, and the existence of ginneries. The average price of cotton is roughly Ksh. 27 per kilogram, and farmers typically travel around 58 km to reach the nearest ginnery. The considerable standard variation in the distance to the ginnery indicates that its position is not evenly dispersed relative to the cotton farms in Kisumu County. There appears to be a difference in grain access, potentially attributable to several factors. Cotton producers in the region may lack the motivation to entice investors into the cotton business. A further problem is the insufficient governmental commitment to rejuvenate the cotton sector in Kisumu County as a prioritized economic contributor to national GDP. The significant, moderate fluctuation of cotton prices may account for alternative regional agricultural priorities for several reasons highlighted in this text. The descriptive statistics indicate that the relative impacts of religion and beliefs on cotton production in this region cannot be assessed in isolation, suggesting that their overall effects fluctuate around a central tendency. The study's findings indicated that price and belief are significant at both the 0.01 and 0.05 significance

levels. This indicates that the sustainability of cotton production in the target area is influenced by economic factors and cultural issues, with beliefs being the most significant. The lifestyle of a populace (culture) is intimately linked to their production decisions. The ownership and distribution of production elements, together with the marketing of their outputs, are influenced by culture. In other words, opinions significantly influence individuals' economic activities. This is further evidenced by the division of gender roles within the cotton production chain, as demonstrated in the preceding sections. This also signifies that pricing has an inverse correlation with sustainability. If the market price of cotton continues to decline, many farmers may abandon cotton cultivation, thus hindering the sector's revival in Kisumu County. Nevertheless, the resurgence of the cotton sector in Kisumu County must be accompanied by strategies to enhance market pricing, such as incentivizing more farmers to favor cotton cultivation over alternative crops. The results indicated a negative correlation with distance from the ginnery. This indicates that a ginnery located far from the cotton source will adversely impact the long-term sustainability of cotton production. This may be ascribed to factors such as time spent reaching the ginnery, increased logistical expenses for transporting raw cotton to the ginnery, and inadequate infrastructure for transporting raw cotton, among other causes. This indicates that any strategy to rejuvenate the cotton industry in Kisumu County must examine the equal distribution of ginneries and their corresponding outlets accessible to cotton growers. Despite cotton being mostly a smallholder crop in Kisumu County, enhanced output will substantially affect poverty levels. West African governments have effectively illustrated the correlation between cotton output and poverty alleviation, positing that cotton cultivation is their primary approach to economic advancement. Other

research (Mazhazha-Nyandoro & Sambureni, 2022) has sought to elucidate why fluctuations in agricultural prices frequently influence cotton farmer poverty less than anticipated. Numerous sources have reported a growing debt issue among many smallholder cotton farmers. Nakelse et al. (2017) demonstrated that over 50% of farmers in their sample were in debt. The intricacies of poverty dynamics, transient poverty, and poverty traps necessitate additional data and empirical analysis to sufficiently elucidate the effects of cotton production in Kisumu County on the poverty levels of cotton farmers. The research indicated that cotton growers have attained restricted access to agricultural loans, equipment, fertilizer, and limited infrastructural enhancements such as roadways. Nakelse et al. (2017) propose that monetary income, access to credit, resources, training, and education may explain smallholders' persistence in cotton farming despite declining prices. The complete reliance on cotton as a cash crop renders the livelihoods of impoverished cotton farmers in Kisumu County susceptible to climate, market, and supply chain fluctuations. While small-scale farmers may find it challenging to affect these conditions, their ability to adopt effective production and management strategies might mitigate their risks. Numerous researchers emphasize the importance of livelihood and crop diversification for these farmers to mitigate reliance on cotton and the adverse effects of commodity price volatility on cotton farmers. The impact of cotton production on poverty reduction is contingent upon the farming practices employed and various other factors (Sneyd, 2017b). Food security is especially pertinent in Kisumu County, marked by prevalent subsistence farming. Cotton cultivation in the region has long been viewed as a competitor to food production, jeopardizing food security. Limited published literature elucidates the correlation between cotton cultivation and food security in Kisumu County.

Food security initiatives undertaken by Michigan State University in various African nations (e.g., Mali, Zambia, Mozambique—Kelly et al., 2014) have highlighted the significance of the "food security first" dilemma subsistence farmers face when transitioning to new income crops. This idea elucidates farmers' reluctance to cultivate cotton without the requisite social changes to address labor limitations in producing food and income crops. Enhancing cotton yield can facilitate the integration of mixed cotton and food plantings. The considerable distance to the cotton ginneries subjects cotton to significant damage risks. This is a consequence of the current process or forthcoming events. Cotton farmers in Kisumu County face several risks, including adverse climatic events that may negatively impact cotton production and quality, such as a delayed onset of the rainy season, insufficient rainfall during critical periods, or excessive rainfall leading to crop damage; the potential for reduced production volume and quality due to pests or diseases, exacerbated by inadequate provision of costly and uncertain-quality production inputs and insufficient farmer knowledge regarding alternatives to synthetic pesticides; the possibility of lower-than-usual cotton quality during a season, complicating sales; and the risk of damage or theft of cotton products at any point in the delivery process, resulting in diminished value. Cotton producers worry more about price risk during declining cotton prices than rising prices amidst market instability. Since price is directly linked to several economic aspects, they collectively contribute to the overall uncertainty regarding the economic feasibility of cotton production. Nonetheless, the financial prerequisites for engaging with futures and options render these products inappropriate for the small and medium cotton producers in Kisumu County. This section delineates the response rate, and the characteristics of the respondents analyzed.

Table 4.17: ***Distribution of Response Rate on Distributed Questionnaires***

Questionnaire category	Frequency	Percent
Filled and returned	267	91.12
Not returned	26	8.88
Total	293	100

Source: Survey data, 2017

Table 4.17 indicates that 91.12% of participants completed and submitted the questionnaire. This response rate is satisfactory for self-administered questionnaires. Mugenda (2013) asserts that a response rate of 22% guarantees accuracy and reduces bias. The study's response rate of 91.12% was adequate to fulfill the established objectives.

4.4 Diagnostics Tests

Williams, Grajales, and Kurkiewicz (2013) contend that most statistical tests depend on certain assumptions regarding the variables employed in the analysis. To meet the statistical criteria, we conducted the following tests: the sampling adequacy test, normality test, linearity test, internal consistency test, multicollinearity test, and homoscedasticity test.

4.4.1 Test of Sampling Adequacy

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy offers an index ranging from 0 to 1, indicating the proportion of variance among variables that may have a similar variance (Oyamakin & Chukwu, 2014). We employed the Kaiser-Meyer-Olkin (KMO) statistics to assess sample adequacy. The test offers a statistical overview of the partial correlations' magnitude compared to the zero-order correlations. The KMO measurements range from 0 to 1, with values approaching one being preferable and a threshold set at 0.5 (Williams et al., 2012). Table 4.18 presents the KMO test statistics calculated for this investigation.

Table 4.18: ***Sampling Adequacy Test Results***

Variable	KMO Test Statistics

Sustainability of Cotton Production	0.904
Religion	0.893
Cultural Beliefs	0.840
Gender Issues	0.913
Marketing	0.761
Distance from Buying Centres	0.711

Source: Survey Data (2017)

4.4.2 Hypotheses Testing

i. Regression Analysis

The research employed regression analysis to evaluate all the possibilities. Before executing the regression analysis, various diagnostic tests were essential to ascertain

CHAPTER FIVE

RESULTS AND DISCUSSION

5.1. Introduction

This study reveals that significant social factors affecting cotton farming techniques include gender, religion, and cultural attitudes. Conversely, economic factors present opportunities and constraints for local farmers, encompassing market access and closeness to purchasing hubs. Ultimately, the government, NGOs, and diverse agricultural organizations have initiated numerous initiatives to enhance cotton sustainability, but their execution has been inadequate. The following sections will elaborate on these aspects in further detail. This chapter discusses the study's outcomes and findings.

5.2 Findings

The primary aim was to ascertain the societal elements affecting sustainable cotton production and development in Kisumu County. The second purpose was determining the economic issues affecting sustainable cotton production and development in Kisumu County. The third purpose was to assess the interventions implemented and their impact on sustainable cotton production and development in Kisumu County. Social factors like gender, religion, cultural views, economics, marketing, and proximity to purchasing hubs impacted sustainable cotton production in Kisumu County. The primary aim of this study is to assess the social aspects of gender, religion, and cultural beliefs affecting sustainable cotton production and development in Kisumu County, Kenya. The variable gender was

defined by awareness of one's sex-specific social attributes and the influence of gender-related factors in agriculture. The study primarily localizes the gender concerns to the study area. We assess the statistical significance of a testable hypothesis asserting that gender does not substantially affect sustainable cotton output in Kisumu County, Kenya. Inferential statistics indicate that gender concerns significantly influence sustainable cotton production ($B = 0.431$, $t = 1.641$, $R2 = 0.722$, $F(1,79) = 205.445$, $p < 0.05$).

Addressing gender in cotton production necessitates integrating economic development, gender equality, and environmental practices. Integrating gender-sensitive policies, programs, and initiatives to foster inclusive and resilient societies while attaining the Strategic Development Goals (SDGs) is essential. SDG 5: Gender equality is crucial for sustainable development. In cotton production, gender equality refers to ensuring equal opportunities, rights, and access to resources for both genders. Mitigating gender gaps in cotton agriculture can enhance productivity and livelihoods and foster more resilient communities. SDG 3: The quality of health and well-being, together with gender dynamics, influences health outcomes. Women's involvement in cotton agriculture is intricately linked to their health and well-being. Addressing gender-specific health requirements can result in healthier cotton-producing communities. SDG 4: Quality education guarantees inclusive and equitable education while fostering lifelong learning opportunities. The significance of education in cotton production lies in its capacity to empower individuals. Gender gaps in education impede cotton producers' ability to use sustainable methods. Delivering high-quality education to both genders in cotton-producing regions augments their skills and knowledge. Gender is a crucial element of cotton production, as evidenced across the value

chain in Kisumu County. Despite facing restricted access to land, loans, and other agricultural resources, women engage in cotton cultivation. Despite facing restricted access to land, loans, and other agricultural resources, women engage in cotton cultivation. The findings indicate that mitigating gender disparity substantially enhances sustainable farming practices and boosts agricultural output. Despite their substantial contributions to labor, women often have restricted opportunities to participate in decision-making processes, potentially affecting their capacity to embrace sustainable agriculture technologies. The gendered roles established in households and communities may influence participation in cotton cultivation and the allocation and utilization of resources. Female farmers frequently face land ownership rights denial in numerous countries, which limits their ability to invest in long-term sustainable practices like crop rotation, soil conservation, or organic farming. Addressing these gender-based inequalities would significantly contribute to ensuring sustainable cotton production. Establishing mechanisms that facilitate women's access to land, loans, and agricultural training is essential. Moreover, gender-disaggregated statistics are essential for identifying the special requirements of female cotton growers and tailoring interventions accordingly. Moreover, exclusive agricultural extension services for women farmers can significantly improve the productivity and sustainability of their agricultural practices. Gender equality intricately connects to these overarching developmental outcomes, including poverty alleviation, food security, and community resilience. The empowerment of women farmers in cotton cultivation will significantly contribute to achieving SDG 5 on gender equality, SDG 1 on eradicating poverty, and SDG 2 on eliminating hunger in Kisumu County. Empowered women will likely implement enhanced sustainable agricultural techniques that elevate

family well-being and contribute to the region's economic development. Incorporating gender considerations in environmental sustainability and community resilience will enhance the discourse on sustainable cotton production in Kisumu County. Gender imbalance in production adversely impacts women and the overall environment, which could foster sustainable agricultural practices that ultimately benefit the entire community. Incorporating women into cotton production could augment innovation and sustainability in agricultural methodologies. Women are more likely to support sustainable agriculture due to their proximity to the land and family resources. The main results indicate that women's involvement in farming decisions and training is crucial for the increased popularity of integrated pest management, organic farming, and agroforestry. This could lead to better soil health and more species living in the area. Crucially, women's involvement in cotton cultivation may catalyze economic diversification within their community. Women with the necessary skills and support to cultivate sustainable cotton can enhance value through textiles or handicrafts, fostering economic resilience. This can generate employment and invigorate local economies by diminishing reliance on conventional cash crops and improving food security. Furthermore, education is crucial in diminishing the gender disparity in sustainable cotton production. Consequently, targeted educational initiatives that address the specific challenges faced by women farmers, such as resource accessibility and knowledge of sustainable techniques, could enhance their production and self-assurance. Supplementary mentorship initiatives that pair novice women farmers with seasoned counterparts will provide a supportive network conducive to information exchange and collaboration. The potential future of cotton production in Kisumu County, in light of the uncertainties posed by climate change, will be of similar significance. Any

changes in their environment directly impact women, who are integral contributors to agricultural and family management. Therefore, it is crucial to integrate climate adaptation measures into cotton-growing initiatives. Educating women on resilient agricultural practices, such as drought-resistant cultivars and water conservation methods, can enhance their adaptive potential and improve their livelihood security. It is necessary to promote collaborations among players in government agencies, NGOs, and the commercial sector to enhance gender equality in cotton production. These initiatives will formulate policies facilitating women farmers' access to land, credit, and training opportunities. The participation of males in the discourse is equally vital, as it facilitates a collective approach to addressing gender disparity and fosters shared responsibilities in agricultural endeavors. Addressing gender gaps in cotton production is complex and involves environmental sustainability, economic diversification, education, and climatic resilience. Women's empowerment in agriculture will significantly contribute to sustainable cotton production, benefiting women farmers and the broader society in achieving the Sustainable Development Goals. The second social aspect pertains to religion and its impact on agricultural practices, encompassing the guidance of religious principles, the role of the supernatural in farming, and adherence to a specific faith. The research findings indicate that the study area observes all dimensions of the variable religion. We assess the statistical significance of a testable hypothesis asserting that religion exerts no substantial impact on sustainable cotton production and development in Kisumu County, Kenya. Inferential statistics indicate that religion significantly influences sustainable cotton production ($B = 0.867$, $t = 3.416$, $R2 = 0.686$, $F(1,79) = 172.569$, $p < 0.05$).

Religious convictions influence values and practices associated with cotton growing. Numerous religions underscore the importance of proper stewardship of Earth's resources. Particular religious customs affect agricultural selections, sowing traditions, and harvesting rituals. Cotton fields may possess spiritual significance in certain civilizations. Religious doctrines influence perspectives on the ethical treatment of animals employed in cotton agriculture. Religion promotes conscientious stewardship of the environment. Conventional cotton growing employs harmful chemicals such as pesticides and synthetic fertilizers, progressively damaging soil, water, and wildlife. Exposure to chemical pesticides presents health hazards for agricultural workers. Guaranteeing equitable treatment for agricultural workers corresponds with ethical principles. Ethical inquiries concerning transparency and authority emerge within extensive agriculture enterprises. Integrating ecological practices with spirituality aligns with ethical and spiritual values. Wholesome life encompasses stewardship of the land, water, and all sentient beings. We can cultivate cotton responsibly and adhere to religious doctrines by fulfilling our ethical responsibilities. Religion underpins the practice of cotton cultivation in Kisumu County. Religious attitudes, practices, and teachings shape farmers' perspectives of the environment, land utilization, and agricultural techniques. Numerous spiritual traditions emphasize the ethical obligation to responsibly care for the Earth, which also supports sustainable agriculture. It promotes environmental stewardship activities, such as reducing pesticide usage, conserving water resources, and preserving biodiversity in cotton cultivation. Christian and Islamic leaders impart a fundamental principle of stewardship of land and resources, which they regard as a divine gift. Religious leaders in Kisumu County can be vigorous proponents of sustainable cotton growing by promoting ecologically responsible techniques aligned with their faith's

ethical principles. Simultaneously, religion may impede sustainable development when some beliefs or practices resist adopting modern agricultural technology. Religious beliefs may restrict farmers from utilizing genetically modified organisms or synthetic fertilizers. Such issues lead to diminished yields and reduced market competitiveness. Consequently, politicians and development organizations should collaborate with religious leaders to reconcile historic beliefs with contemporary agricultural requirements. The third social component was the influence of cultural beliefs on sustainable cotton production and development in Kisumu County, Kenya. The variable was defined by adopting agricultural norms, social learning, its impact on farming behavior, and the extent to which material resources represent culture. The study area largely observes all facets of cultural beliefs. We assess the statistical significance of a testable hypothesis asserting that cultural beliefs do not substantially affect sustainable cotton production in Kisumu County, Kenya. Inferential statistics indicate that cultural belief significantly influences sustainable cotton production ($B = 1.207$, $t = 4.327$, $R2 = 0.588$, $F(1.79) = 115.107$, $p < 0.05$).

Cultural attitudes profoundly influence society, encompassing cotton production and economic advancement. Cotton holds profound cultural importance in numerous countries. People frequently associate it with purity, tradition, and heritage. Many cultures use cotton garments for important events and celebrations. Cultural perceptions impact the demand for cotton products, influencing local consumption and export markets. Cotton cultivation has traditionally been a crucial catalyst for economic advancement. The expansion of cotton cultivation resulted in the emergence of a worldwide textile industry, altering economies and influencing cultural identities. Cotton represented affluence, authority, and social

hierarchy, impacting fashion trends and trade dynamics among civilizations. Research in Benin underscores the relationship between cotton production and economic growth. Investigating a vector error correction model (VECM) indicated a positive connection. Economic growth favorably correlates with the export of cotton. Long-term relationships link the creation of human capital to sustainable economic growth. Enhancing human capital (education, skills, and health) can improve the quality of employment creation and facilitate upward economic changes. Religious and cultural values profoundly influence the Sustainable Development Goals (SDGs). Religion and culture can profoundly impact climate change, biodiversity decline, ecological degradation, pollution, deforestation, desertification, and unsustainable land and water utilization. By incorporating the environmental aspect of the 2030 Agenda for Sustainable Development, religious and cultural communities can foster robust, inclusive, sustainable, and transformative economies. They contribute to educating individuals about more sustainable lifestyles and habits, considering the consequences of their activities on others. Religion and culture are crucial in alleviating severe poverty by tackling multi-dimensional poverty and facilitating access to essential services. They champion the rights of women, youth, and minorities, ensuring inclusivity for all. Religious and cultural viewpoints can foster new nature-based solutions. Valuing traditional knowledge and cultural variety promotes sustainable development. They cultivate global and local citizenship ethos, underscoring effective government, tolerance, and reconciliation. Religion and culture are key in fostering secure, inclusive, and harmonious societies. Interfaith and intercultural communication intersect on concepts such as the sanctity of nature and the rights of nature. These common values augment the significance of religion and culture in attaining sustainability. In summary,

religious and cultural beliefs overlap with different Sustainable Development Goals (SDGs), promoting a collective vision for an improved future. Cultural beliefs significantly influence cotton agriculture, encompassing crop selection, planting schedules, and harvesting practices. In numerous communities within Kisumu County, cotton represents purity, heritage, and economic prosperity. The current study shows that culture substantially influences agricultural decisions, determining resource utilization and farming practices. Social learning frequently accompanies cultural traditions as youth emulate the agricultural techniques of their ancestors. Although conventional farming methods may have been efficient, they may obstruct contemporary, sustainable approaches. Certain cultural practices advocate for plant species or cultivation methods that are likely less efficient and environmentally detrimental in the current setting. Any effective intervention must acknowledge the significance of cultural beliefs in agriculture. Adherence to local customs and their incorporation into development initiatives will significantly contribute to achieving success. Promoting sustainable cotton production may entail integrating traditional knowledge transmission mechanisms with innovations that improve output while preserving cultural norms. People are simultaneously using cultural practices as a sustainable path forward. Local communities currently engage in several ecological agriculture methods, including crop rotation and intercropping, which are environmentally sustainable and rooted in cultural heritage. Using these approaches, cotton producers in Kisumu County can enhance their yields while safeguarding their traditional legacy. The study's second purpose is to analyze the economic determinants of marketing and proximity to purchasing hubs regarding sustainable cotton production and development in Kisumu County, Kenya. Market-determined trade relationships, such as price, defined the variables.

Volatile and erratic prices will adversely impact cotton production. Respondents diligently engage in all facets of marketing, as indicated by the descriptive statistics presented in the study. We assess the statistical significance of a testable hypothesis asserting that marketing does not substantially affect sustainable cotton production in Kisumu County, Kenya. Inferential statistics indicate that marketing significantly impacts sustainable cotton production. $B = 0.243$, $t = 1.128$, $R^2 = 0.810$, $F(1, 79) = 337.699$, $p < 0.05$.

Market access and pricing are other economic factors that influence the sustainability of cotton production. The research indicated that marketing obstacles, such as variable pricing and the prevalence of intermediaries, significantly affect the profitability of cotton cultivation. Farmers often receive inadequate pricing for their cotton due to mediators extracting significant percentages of the revenues. Thus, the uncertainty of investment returns deters farmers from investing in their farms. This issue is prevalent in the agricultural sectors of many countries and is particularly significant for small-scale farmers in regions such as Kisumu County. Current international demand, supply chain disruptions, and local market conditions influence prices. Kisumu County farmers often face external pressures beyond their control. Enhanced market access will significantly bolster the sustainability of cotton cultivation. This necessitates the establishment of cooperatives to help farmers consolidate their resources and negotiate improved pricing. Enhancing the connections of cotton farmers with broader, more stable markets—such as organic or fair-trade cotton—would stabilize prices and yield more predictable incomes for farmers. As a result, the distance from buying centers was defined by a demand for proximity to these centers and the industry. The accessible descriptive statistics enable the recipients to

manage all distance-related aspects. We assess a testable hypothesis for statistical significance, which asserts that proximity to buying centers does not significantly affect the sustainability of cotton production and development in Kisumu County, Kenya. Inferential statistics indicate that proximity to purchasing centers significantly influences sustainable cotton production. ($B = 0.243$, $t = 1.128$, $R2 = 0.402$, $F(1.79) = 53.092$, $p < 0.05$).

Engaging with market dynamics and proximity to purchasing centers facilitates poverty alleviation, food security, economic development, responsible consumption, climate action, and sustainable land utilization, meeting six Sustainable Development Goals (SDGs). SDG1: No Poverty: Access to markets and equitable pricing are essential for smallholder cotton growers to overcome poverty. The proximity to purchasing hubs influences the capacity to sell produce at equitable prices, affecting income and livelihoods. SDG 2: Zero Hunger: Cotton farming communities frequently depend on cotton as a cash crop. Enhanced market access and equitable pricing elevate household income and food security. SDG 8: Decent Work and Economic Growth: Market accessibility and fair trade practices augment economic prospects for cotton cultivators. The proximity to purchasing centers influences employment prospects and income generation. SDG 12: Responsible Consumption and Production: Sustainable cotton cultivation corresponds with responsible consumption practices. Efficient supply chains and equitable trade practices advantage both producers and consumers. SDG 13: Climate Action: Proximity to purchasing centers influences transportation emissions. Efficient logistics diminish the carbon footprint of cotton production. SDG 15: Life on Land: Sustainable cotton growing practices alleviate soil degradation. The proximity to markets influences land use patterns and ecosystem

health. The results indicate that the distance from purchasing centers substantially impacts cotton output in Kisumu County. Farmers distant from these centers encounter elevated transportation and logistical expenses, diminishing their revenue and, consequently, their capacity to invest in sustainable farming. Rural regions exacerbate this issue due to inadequate infrastructure and infrequent accessibility of transit options. Consequently, minimizing the distance to purchasing centers or enhancing infrastructure that connects farmers to the market is crucial for augmenting the economic sustainability of cotton cultivation. Establishing additional purchasing centers at appropriate places can decrease transportation expenses while enhancing road infrastructure and facilitating efficient market access for cotton. Furthermore, by providing farmers with enhanced access to market information, current prices, and demand trends, they could make informed decisions about the timing and location of crop sales. Such measures would augment the profitability of cotton farming and facilitate the achievement of broader economic development objectives, including poverty alleviation and the enhancement of rural livelihoods. Kisumu County can foster a more resilient and profitable agricultural industry by tackling the economic challenges hindering sustainable cotton production. The correlation between economic conditions and sustainable cotton production in Kisumu County, Kenya, is complex and requires additional evaluation. Market access and proximity to purchasing areas significantly influence cotton production's sustainability and feasibility. These systems' components encompass pricing mechanisms, market fluctuations, loan accessibility, agricultural practices, and infrastructural development. Pricing mechanisms and market variations.

The pricing systems are fundamental to ascertaining sustainability in cotton production. Cotton prices are variable and heavily influenced by global market patterns and local demand, presenting significant problems for producers. Price volatility results in revenue unpredictability, compelling farmers to adopt risk-averse tactics that may not align with sustainable practices. Volatile earnings may compel farmers to prioritize short-term profits, such as maximizing yields through unsustainable agricultural practices, potentially involving an overreliance on chemical inputs. Consequently, it is essential to establish stable pricing frameworks and market transparency to promote sustainable cotton cultivation. This would represent a substantial improvement in collective bargaining and the attainment of superior prices from direct purchasers. Farmers' resource pooling mitigates risks associated with price fluctuations and enables them to negotiate more favorable conditions. This will foster economic resilience and incentivize farmers to adopt more sustainable techniques, which, while posing short-term price challenges, may yield long-term advantages. Access to credit and financial services access to credit continues to be a significant barrier for numerous smallholder cotton producers in Kisumu County. The farmers possess constrained financial resources, hindering their capacity to invest in sustainable agricultural technology and practices, such as soil enhancement techniques, irrigation systems, and pest management strategies. Microfinance institutions and agricultural banks should consequently create financial solutions tailored to the needs of farmers, enabling access to low-interest loans that promote the implementation of sustainable farming practices. The financial literacy training will empower farmers to make informed financing decisions and comprehend the long-term advantages of investing in sustainable practices. Training in budget management, investment plans, and risk

assessment could improve their decision-making abilities in navigating the economic terrain toward a more sustainable and productive cotton sector. Infrastructure, advancement, and transportation. The economic viability of most cotton producers in the rural parts of Kisumu County is consequently contingent upon physical infrastructure. Underdeveloped road networks and the consequent inefficiencies in transportation elevate logistical costs to unprecedented heights, rendering cotton production less feasible. Infrastructure expenditures, like the development and maintenance of roads, can significantly enhance farmers' market access and reduce transportation costs. Additionally, establishing strategic procurement centers near cotton cultivation regions would alleviate transportation and logistical challenges. A center can serve as an aggregation, processing, and marketing hub for cotton, thereby assisting farmers in selling their produce. The system can facilitate improved access to market information for farmers via digital platforms, enabling them to make informed decisions regarding pricing and timing and maximize their returns. Market diversification and value enhancement Furthermore, market diversification and value enhancement would significantly improve the sustainability of cotton production. Farmers should investigate chances to participate in value-added activities within the cotton business, like spinning, weaving, or enhancing cotton-based products. This transition from raw cotton farming to value-added enterprises can significantly enhance farmers' incomes and generate employment possibilities in the surrounding community. Moreover, organic cotton cultivation will create new market opportunities due to the rising demand for sustainable and ethically sourced textiles. In this regard, it is essential to implement organic farming through the teaching, facilitation, and training of farmers. Farmers can achieve enhanced price stability by engaging in specialized markets while promoting

environmentally sound farming techniques that sustain livelihoods. We are enhancing gender equality in economic engagement. Another significant topic to consider is the relationship between gender and the economic factors influencing the sustainable production of cotton. Women play a crucial role in cotton agriculture; consequently, numerous systemic obstacles have marginalized them from resources, markets, and decision-making processes. We must address disparities to achieve economic sustainability in cotton production. We should establish targeted training programs to enhance the expertise and understanding of women in sustainable agriculture. The relevant policies must guarantee access to credit and land ownership, enabling women's participation in the cotton value chain. Using gender-sensitive strategies in agricultural policies has fostered an environment that acknowledges their contributions and ensures equitable access to resources. Ecological and social issues Additionally, the economic viability of the cotton crop must fully align with ecological sustainability and social equality. Implementing integrated pest control techniques, organic agriculture, and agroecological strategies that do not negatively impact the environment would entail increased productivity. Policymakers in agricultural organizations must enhance the instructional process for farmers through the adoption of sustainable methods. Social issues encompass community engagement and local expertise, crucial for advancing sustainable cotton production. Participatory decision-making processes can stimulate community-driven initiatives and further reinforce farmers' dedication to sustainability. Farmers can devise context-specific solutions through exchanging knowledge and experience, allowing them to tackle economic issues and promote environmental sustainability. Regulatory and organizational structures. In the future, cotton cultivation will require a robust policy framework to promote sustainable

practices. Consequently, the advancement of agricultural policy should concentrate on endorsing methods such as subsidies for organic inputs, support for cooperative formation, and investments in infrastructure. Moreover, strengthening institutional frameworks that facilitate market access, provide technical support, and promote research and innovation will be essential for guaranteeing long-term sustainability in the cotton sector. Government agencies, NGOs, and private sector entities may collaborate to create synergies that enhance the effectiveness of actions for sustainable cotton production. In this context, activities that enhance collaboration among stakeholders foster an atmosphere conducive to developing inclusive policies addressing the economic, social, and environmental aspects of cotton growing. The study's final goal was to examine the implemented and operational interventions and their effects on sustainable cotton production and development in Kisumu County, Kenya. Interventions, policies, and cotton projects have each contributed distinctly to sustainable cotton production in Kisumu County. The price of cotton may fluctuate significantly due to variables including national regulations, stockpiling, and government subsidies for agricultural producers. This and other variables generate an unpredictable market for farmers, rendering cotton less appealing. In 1906, several immigrants believed that cotton could flourish in East Africa, leading to the founding of the British East Africa Corporation Ltd. This initiative sought to enhance the efforts of the British Cotton Growing Association. The establishment of this entity aimed to encourage the cultivation of cotton. The investigation of districts conducive to cotton cultivation in East Africa commenced in 1907 with ginning plants in Malindi, Kilindini, and Kisumu. Following the nation's independence, the movement's initial objectives waned as no one was responsible for motivating farmers to continue with cotton cultivation. The cultivation regions, particularly

Kisumu County, experienced an impact on cotton production. The peak lint production of 51,000 bales occurred in 2006. The peak coincided with the establishment of the Cotton Development Authority (CODA) in 2005, during which there was a significant influx of funding from the government. Nonetheless, in 2007, production began to decline, reaching its nadir of 21,300 bales in 2010 (Table 2). Despite producing the largest quantity of seed, cotton production declined in 2007, even though it achieved peak yields of 0.69 tons per hectare. Over the past decade, Kenya has endeavored to meet several developmental objectives outlined in Vision 2030, necessitating a substantial emphasis on cotton production. Industries associated with researcher interventions have endeavored to enhance the local production of high-quality cotton raw materials to achieve optimal operational capability. They aim to achieve these objectives, guide the Vision 2030 initiative towards industrialization, and align with the AGOA 2012 deadline to achieve self-sufficiency in raw material production and food security through the availability of financial capital. The Cotton Development Authority (2016) identifies cotton as a vital subsector capable of benefiting 8 million individuals in the country's arid regions. The absence of sustainable production and management in the cotton sector poses a dire threat to over eight million Kenyans, constituting roughly 18 percent of the population. Despite reaching a peak of 38,000 metric tons in 1984/1985, trade liberalization and the accompanying government removal of funding and input provision led to a significant decrease of approximately 14,000 metric tons in 1995, raising serious concerns. The Cotton Development Authority (CODA) and the Agriculture, Food, and Fisheries Authority (AFFA) have projected that 350,000 hectares of land in the country are suitable for cotton cultivation, with an expected annual yield of 50,000 tons. Moreover, cotton was formerly one of Kenya's principal

foreign exchange generators before privatization. The vertically integrated system for input supply, extension services, and seed cotton procurement has disintegrated due to structural adjustment policies. Thousands of cotton growers have abandoned the crop due to the decline in global pricing. The Cotton Amendment Bill (2006) establishes a legal framework for governmental assistance in reorganizing and promoting the cotton sector's growth. Although national production rose from 5,000 tons in 2005 to 9,800 tons in 2006, the outlook remains bleak, as this increase was primarily due to a rise in the number of producers (hectares under cultivation) rather than a significant enhancement in productivity. The increase in the population of smallholder cotton growers in Kenya, especially in Kisumu County, demonstrates this. The average yields of seed cotton range from roughly 400 kg/ha to 600 kg/ha. Farm parameters are moderating variables that influence the relationship between socioeconomic factors and sustainable cotton production and development in Kisumu County. We assess the statistical significance of an evaluative claim that farm characteristics do not significantly moderate the link between socioeconomic factors and the sustainability of cotton production in Kisumu County, Kenya. Inferential statistics indicate that agricultural factors significantly influence the correlation between socioeconomic factors and sustainable cotton production and development in Kisumu County. The economic sustainability of cotton production methods is crucial for assessing the living conditions of cotton farmers, irrespective of the agricultural system employed. The prices of rival crops are the primary economic influences shaping cotton acreage and output trends. Since 1990/91, global cotton prices have declined compared to cereals and oilseeds. The cotton and cotton textile industries are crucial to the economic development of industrialized and developing nations, including

Kenya. The greater the area dedicated to cotton cultivation, the more substantial the crop's impact on land use following food grains. The research found that cotton cultivation in Kisumu County predominantly occurs within familial groups. Fortucci's (2002) report indicates that more than 100 million households directly cultivate cotton. Cotton additionally engaged numerous individuals in associated sectors within Kisumu County, including agricultural inputs, machinery and equipment fabrication, cottonseed processing, and textile production. Cotton plays a crucial role in the industrial advancement of Kisumu and serves as a substantial source of income. Despite initial success, obstacles arose: suboptimal yields in cotton fields, workforce indifference impacted output, and textile mills encountered difficulties. The issues above resulted in a decrease in cotton production in Africa. Kisumu's identity intricately links to KICOMI's legacy. It signified the evolution of cash crop cultivation throughout the continent. The ascendance and decline of KICOMI exemplify wider transformations in African cotton mills and economies. KICOMI's initiatives initially enhanced local cotton output and economic growth in Kisumu. Nonetheless, obstacles and evolving dynamics affected its sustainability over time. Understanding this background elucidates contemporary initiatives aimed at enhancing sustainable cotton practices. Increasing earnings by producing cash crops for export, primarily to affluent nations, can elevate smallholder output and living standards, potentially achieving superior prices compared to domestic markets. However, the issue of cash crops presents a challenge as consumers and interest groups scrutinize their cultivation's social and environmental conditions. The primary social challenges include child labor, labor rights, workplace health and safety, income disparities, and food security. The primary environmental concerns include deforestation, biodiversity loss, water usage,

and pesticide application. Elevated expectations and rigorous requirements from affluent nations often clash with the limited resources of low-income countries and their smallholder farmers in meeting these demands. Cotton Made in Africa (CmiA) is an illustrative case study for these difficulties. Founded in 2005, this textile sustainability label aimed to accomplish three interconnected objectives: 1. Enhancing the living standards of African smallholders engaged in cotton cultivation. The second objective is establishing environmental and social criteria for primary production while enhancing productivity. Ensure the traceability of sustainably produced cotton from the consumer to the producer. The training of smallholders has received significant funding. CmiA is particularly intriguing because it operates within a broad market rather than in exclusive specialized areas. As a result, "CmiA Certified" encompasses around one million smallholder cotton-producing farm households, accounting for at least six to seven million family members. These farms manage an average of six hectares of agricultural land, with around one-third allocated to cotton cultivation and the rest for maize and other food crops. The experiences of these smallholders are relevant to an additional 30 to 40 percent of African smallholders who cultivate conventional income crops, including coffee, cocoa, rubber, palm oil, and cashews. Enhance the characteristics of traditional cotton seeds, including drought resistance. In the United States, Australia, and Brazil, cotton producers' associations allocate millions toward seed development, whereas investments in Africa are low. AbtF should initiate changes by investing in seed development alongside national and appropriate international research institutions, such as the French research center CIRAD. Facilitate training and investment in preserving and enhancing soil fertility while concurrently minimizing carbon emissions. This involves compost, which may require the

construction of concrete compost pits, depending on the chosen method. We also recommend constructing stone barriers to mitigate soil erosion. These responsibilities necessitate investments that will not yield returns within a year; therefore, offering investment grants to small farmers is advantageous. To enhance cotton production without compromising food output, it is frequently essential to mechanize the cultivating process, utilizing animal traction or tractors. It is crucial to recognize that the youth in Kisumu County no longer envision a future in agricultural labor using hand hoes. The integrated system implemented by the French in Francophone West and Central Africa saw cotton producers being contracted by initially parastatal monopoly cotton firms, which are now predominantly privatized, although systemic changes are still required. Cotton growers receive a legally assured purchase price prior to planting. They receive seeds, fertilizers, and insecticides for cultivation, prefinanced through loans. Following the harvest, cotton firms finance farmers' input purchases and operate the gins; they then acquire and gin the cotton before marketing it globally. We deduct the prefinanced input expenses from the cotton's buying price. Consequently, in contrast to their counterparts in other African agricultural sectors, cotton farmers receive consistent access to agricultural inputs.You can use loan guarantee money or interest subsidies to buy livestock, tractors, and equipment. This necessitates the establishment of service centers and training programs for mechanics, together with providing business training for farmers. Smallholders participate in a one-week course under the Farmer Business School (FBS) initiative, which helps them view their farms and households as potential enterprises. They participate in interactive training sessions to calculate the cost-benefit ratio for various crops, considering factors such as pricing and inputs, including labor. Approximately 240,000 farmers and 80,000 women

underwent FBS training during the COMPASS initiative. Participants and cotton corporations in Kisumu expressed satisfaction with the training, even though some East African farmers switched from cotton cultivation to more lucrative crops like soybeans. Based on experience, FBS training requires consistent monitoring and regular updates. The implementation necessitates the engagement of proficient teachers and master trainers, alongside the continuous modification of the curricula. External financing is required for costs, including establishing and supporting women's cooperatives. Households engaged in cotton cultivation are predominantly male-led. Farmers allocate the revenue from cotton sales towards substantial acquisitions (like a new roof), investments (mechanization), durable consumer goods (like mobile phones, bicycles, mopeds, and televisions), and, for affluent farmers, occasional pilgrimage trips to Mecca. In contrast, women manage food and clothes, financing these through secondary activities such as vegetable farming, small animal husbandry, and commerce. The obstacles to commencing and advancing such endeavors are significant for self-employed women. Establishing and financing women's cooperatives, referred to as women's clubs in East Africa, considerably facilitates surmounting such obstacles. Standard financial activities encompass the financing of start-up investments. Besides financing agricultural inputs supplied by companies, these cooperatives allow farmers to secure loans at reasonable interest rates to address additional needs, including children's education (school uniforms), medical appointments, livestock acquisition, or personal consumer expenditures. Typically, this approach enables farmers to obtain loans from local lenders at exorbitant interest rates, given their accessibility; the primary source of liquidity for these credit unions is the income from the cotton harvest. Digital payments are a significant advantage in rural Africa, especially regarding security

concerns. These payments are automatically deducted and collateralized farmer loans, ensuring elevated payback rates, thereby facilitating the economic viability of credit unions and reducing interest rates for farmers. Furthermore, sustained and extensive investment in the efforts above facilitates the integration of sustainable cotton standards, such as CmiA, in rural Africa. Although numerous cotton enterprises and farmers regard the exclusive emphasis on certification as essential for entering the certified market, they also perceive it as a burdensome requirement laden with bureaucratic obstacles. Only when they make continuous investments in agricultural production and quality of life can local actors positively identify with the certified cotton they produce and cultivate a sense of shared destiny, or more aptly, a community of actors.It is imperative to abandon chemicals in favor of biopesticides. In addition to smallholder income, pesticide usage constitutes the second challenge confronting CmiA. Cotton is very vulnerable to illnesses and pests. Cotton cultivation occupies only 2.4 percent of agricultural land. Nonetheless, it accounts for six percent of total pesticide usage, with 16 percent of all insecticides directed towards conventional cotton cultivation (excluding CmiA Organic). We anticipate alleviating the detrimental effects of chemical pesticides by prohibiting specific hazardous pesticides and instructing farmers on using protective attire. Farmers should apply pesticides solely when there is a significant pest outbreak, as per the implementation of pest thresholds in Integrated Pest Management. This method alone can decrease pesticide usage by 30 percent. Nonetheless, numerous farmers fail to implement the insights from this training segment. Protective attire is exceedingly uncomfortable in elevated temperatures, while the repetitive enumeration of pests and beneficial organisms is arduous. As a result, numerous CmiA and BCI farmers continue to apply excessive pesticides unsafely, causing headaches

and dermatological issues. Environmental contamination continues to be an issue. A methodical approach to the pesticide dilemma would involve substituting chemical pesticides with biological alternatives. This entails utilizing indigenous flora, frequently regarded as weeds, to manufacture biological insecticides. We establish molasse traps to capture harmful insects. CmiA collaborators in Tanzania and Zambia have demonstrated the efficacy of these approaches over the past five years, establishing their capacity to supplant chemical pesticides completely. Consequently, novel income streams have emerged for women engaged in the collection and, in certain instances, the processing of plants. The CmiA and the BCI should strategically transition the pest control system for the certified cotton production process to more biological methodologies without requiring an immediate shift to organic cotton. They should also persuade their partners in the Global South of the importance of this strategic change. Achieving this will present promising opportunities for African cotton farmers. Minimizing expenses and generating substantial licensing fee revenue for certified cotton, even in large textile markets, may yield greater income increases than non-certified cotton production. Consequently, farmers cultivating merely a few hectares attain a commendable standard of living and promising opportunities within their local contexts, including brick houses with corrugated iron roofs, a moped (or possibly a solar panel), and secondary education for at least some of their children. Establishing sustainability standards for consumer products and implementing them in the mass market of Kisumu County can directly enhance the desired social and environmental effects. There are compelling reasons to believe that they can enhance the incomes of smallholders and ultimately elevate many from poverty. Cotton, albeit a non-food cash crop, can enhance food security for smallholders through money generation and foster local

food production via various additional impact channels. Assistance for farms to adhere to regulations and implement impact channels must supplement standard-setting. Ensuring social and ecological norms while attaining a "living income" for smallholder farmers remains a significant problem. While publicly supporting the initial phase of implementing sustainability standards offers numerous advantages, it is imperative that the value chain subsequently finances these requirements. Textile retailers and customers must eventually bear the cost of the goods they purchase, including those produced under sustainable standards. The widespread adoption of sustainability norms requires time and patience, so we cannot anticipate significant enhancements in farmers' local living circumstances and incomes in the near to medium term. This necessitates sustained investment in smallholder farming and local ecosystems over an extended period. We must conduct rigorous and ongoing impact evaluations tailored to the intricate realities of African smallholder agriculture to determine how compliance with sustainability criteria enhances the well-being of smallholder farmers. Cotton cultivation in Kisumu County has experienced a notable shift, heralding a new epoch of agricultural wealth. The county has accomplished 100% of the designated acreage for cotton cultivation within six months of reintroducing high-breed seeds. This agricultural revival has resulted in a remarkable surge in productivity, with almost 600 tons of cotton prepared for harvest, a significant increase from the prior yield of around 50 tons. The government's repeal of the prohibition on GMO (BT) cotton seeds led to allocating 12 tons of traditional cotton seeds, 140 kg of biotechnology (BT) hybrid seeds, and 480 kg of hybrid cotton seeds, reviving cotton cultivation in Kisumu. The seeds were distributed by eight cooperative organizations, including Kobura, Seme Kisumu, Muhoroni, Nyakach, Nyando, Kisumu East, Kimira, and

Kano Kajulu farmers' cooperative groups. The provision of high-quality seeds by the national government for experiments has proven transformative. The Agricultural Sector Development Support Program (ASDSP), Agricultural Information Initiative (SAII), and the county's cooperative directorate have collaborated to enhance cotton cultivation in the region. The hybrid seed has demonstrated resistance to the bollworm, a notorious pest in cotton cultivation; hence, it has greatly enhanced productivity. The economic ramifications of this agricultural surge are significant. A farmer can generate a maximum income of Ksh 130,000 from a single acre of land, given that the current average yield of cotton seed is 300 kg per acre. The prospective maximum yield of the new cotton hybrid, or BT seed, is 2000 kg per acre under rainfed conditions and can reach 2500 kg per acre under irrigation. This profitability exceeds conventional crops such as maize and millet, which generally yield approximately Ksh 17,000 per acre. This advancement has drawn farmers to cotton growing, with Seme-Sub County recording 30 farmers this planting season. The future of cotton farming in Kisumu County appears optimistic and encompasses various strategic initiatives: Ongoing Expansion of Cultivation: Following the successful attainment of 100% of the targeted acreage, there is an emphasis on further enlarging the cultivation area and augmenting the number of farmers engaged in cotton farming. Improved Seed Quality: Hybrid and BT seeds have demonstrated efficacy. The county intends to continue distributing these seeds to combat pests like bollworms and guarantee elevated yields. Market Security: The secured market at Salawa Ginnery and the prospective establishment of the Rivatex factory in Nyando Sub County provide farmers with a dependable outlet for their produce, fostering consistent production and investment in cotton cultivation. We are emphasizing the profitability of cotton farming to attract more farmers. Cotton is a viable

alternative for local farmers, with the possibility for substantially higher earnings compared to conventional crops. Infrastructure Development: Rivatex plans to establish a new factory on a 2.5-acre public land parcel in the Jua Kali region along the Kisumu-Nairobi highway, expecting to create employment opportunities and a stable market for cotton farmers. Supportive Partnerships: Collaborations with entities such as ASDSP, SAII, and cooperative directorates will persist in offering assistance through seeds, pesticides, and training to improve the productivity and sustainability of cotton agriculture. These measures aim to enhance cotton production, elevate farmers' living standards, and bolster the local economy. The forthcoming strategy is to sustain the acquired momentum and capitalize on the prospects arising from the resurgence of the cotton industry in Kisumu County. The prospects for cotton cultivation in Kisumu County seem promising as Rivatex plans to establish a factory in Boya, Nyando Sub County, which is expected to create jobs for over 300 individuals. The construction of this company on a 2.5-acre public land parcel in the Jua Kali region along the Kisumu-Nairobi route will create a market for cotton producers and enhance the local economy. Consequently, governmental policies and institutional backing are crucial in determining the sustainability of cotton production in Kisumu County. Numerous initiatives, such as forming the Cotton Development Authority and introducing genetically modified cotton seeds, have advanced the cotton subsector in recent years. However, the inconsistent implementation of these programs has diminished their efficacy and exhibited a deficiency in long-term strategy. Notable issues in the cotton sector include lacking a cohesive policy framework integrating sustainable objectives with economic development. Despite the Cotton Amendment Bill 2006 establishing a legal framework to support cotton growers, most of its provisions remain unimplemented. The

government's support for cotton production has been uneven, marked by significant investments during certain periods, followed by periods of complete indifference. Promoting sustainable cotton necessitates the government's establishment of coherent and comprehensive policies to ensure farmers' access to modern agricultural inputs, including superior seeds, fertilizers, and enhanced insect control techniques. This should also entail investment in agricultural research and extension services. Sustainable cotton farming methods, like organic farming and using bio-pesticides, must be made easier to develop by the policy framework. These methods increase output while having the least negative effects on the environment. Numerous technical advancements possess the capacity to transform cotton agriculture in Kisumu County. The introduction of GM cotton seeds has resulted in significant production increases, as all variants of the bollworm cannot damage these GM cotton plants. Nonetheless, the implementation of this genetically modified technology has fluctuated, and most farmers lack comprehensive information or resources to utilize such technologies. In addition to GM seeds, other innovations with significant potential to improve the sustainability of cotton cultivation encompass precision agriculture, drip irrigation, and the utilization of drones for crop health monitoring. Precision agriculture techniques will allow farmers to minimize excessive use of inputs such as water, fertilizer, and pesticides with a focus on efficiency. Drip irrigation methods conserve water, which is crucial in arid regions. Nevertheless, these technologies necessitate that farmers receive training and knowledge to utilize them efficiently. This necessitates investment in agricultural extension services and establishing a collaborative framework among government agencies, NGOs, and private sector enterprises. Equipping farmers with the skills and knowledge necessary for adopting sustainable agricultural

practices will surely enhance the production and resilience of the cotton sector in Kisumu County. The financial determinants of sustainable cotton production in Kisumu County, Kenya, do not just stop at marketing and distance from buying centers. In this respect, it becomes essential that such areas as pricing mechanisms, access to credit, infrastructure development, market diversification, and gender disparities within the subsector must be effectively addressed if a resilient and sustainable cotton sector is to be achieved. Holistic approach: Stakeholders can give cotton a solemn boost by incorporating economic, social, and environmental considerations to ensure farmers have a sustainable livelihood. All efforts toward the attainment of the Sustainable Development Goals with regard to creating a more equitable and inclusive agricultural landscape in Kisumu County must be pursued vigorously. In summary, Kisumu County's strategic measures in cotton cultivation have augmented productivity and improved the livelihoods of local farmers. Introducing high-breed seeds, insect resistance, and a secured market has collectively transformed cotton into Kisumu's new 'gold,' establishing a benchmark for agricultural innovation and economic development.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter gives conclusions from the study and recommendations while highlighting suggestions for further research.

6.2 Conclusions

The first objective determined the social factors—gender, Religion, and cultural beliefs—that affect sustainable cotton production and development in Kisumu County, Kenya. Inferential statistics reveal that gender issues, as do Religion and cultural beliefs, have a statistically significant effect on sustainable cotton production. The study's second objective examined the economic factors: Marketing and Distance from buying centers on sustainable cotton production and development in Kisumu County. The variables were characterized by exchange relationships that are determined in the market, such as pricing, fluctuating, and unstable prices that negatively affect cotton production. Inferential statistics reveal that marketing has a statistically significant effect on sustainable cotton production. Distance from buying centers, as a variable, was characterized by a preference for a closer location to buying centers and or to industry. Inferential statistics reveal that distance from buying centers has a statistically significant effect on sustainable cotton production.

The third objective of the study addressed the interventions that have been and are currently in place and how they influence sustainable cotton production and development in

Kisumu County, Kenya. Interventions, policies, and cotton initiatives have all played specific roles in achieving sustainable cotton production in Kisumu County. However, sustainable cotton production has yet to be achieved. Sustainable cotton cultivation in Kisumu County is crucial for achieving economic development, social fairness, and environmental stewardship. Various factors influencing sustainable cotton production necessitate a multilevel strategy to tackle difficulties and capitalize on opportunities within the sector.

Sustainable cotton production necessitates the involvement of multiple stakeholders, including government agencies, NGOs, community leaders, and farmers. A pathway for a prosperous and sustainable cotton sector that benefits humanity and the environment through innovation, community empowerment, and environmental stewardship can be established. The pursuit of sustainable cotton production necessitates all stakeholders' collective contributions to create a fabric of resilience and success, honoring the cotton plant and those who cultivate it. This would facilitate achieving sustainable development goals while fostering a robust cotton industry that promotes economic growth, social equity, and environmental protection.

6.3 Recommendations

The study addressed the social factors: gender, Religion, and cultural beliefs on sustainable cotton production and development in Kisumu County. It determined the economic factors: Marketing and Distance from buying centers on sustainable cotton production in Kisumu County. Finally, the study addressed the interventions that had been put in place and are

currently running and how they influence sustainable cotton production in Kisumu County, Kenya. As such, the study recommends that the following measures should be taken;

- To minimize negative gender issues, the study recommends launching initiatives in Kisumu County to empower women in cotton-producing regions. The government should bring organizations like Cotton Connect to work with women to enhance their knowledge and confidence through health, rights, and enterprise development education programs. The government should organize Gender Training Programs to achieve SDG No. 5 by promoting gender equality and empowering women and girls in cotton-producing communities. Programs focusing on women's health, nutrition, and access to healthcare contribute to achieving SDG 3.
- Integrating gender-sensitive health interventions within cotton production systems can improve community health. Gender awareness should be advocated within the region. Gender sensitization measures should be addressed, including the importance of women in society and cotton farming. Considering the health of the high number of women involved in cotton farming, the National Government and the County Government should advocate for and assist in supplying farm inputs, such as improved cotton varieties that require less spraying because chemicals negatively affect females, especially during pregnancy. Also, modern technology should ease the work of females who double up on both productive and reproductive roles in the family. Efforts to promote education for girls and women in cotton-producing regions contribute to SDG 4. Training programs that address gender-specific barriers to education can lead to more informed and resilient cotton farming communities. Gender-Disaggregated Data Collection: Collect data that precisely captures gender differences in cotton farming practices, access to resources, and vulnerabilities and

this data to inform targeted interventions. Capacity Building and Training should be done to empower women and men with knowledge and skills related to sustainable cotton farming. Provide training on climate-smart practices, pest management, soil conservation, and access to resources to ensure equitable access to land, credit, and inputs. Promote women's ownership of land and productive assets. Decision-Making and Participation: Encourage women's participation in decision-making forums related to cotton production. Create platforms for women to voice their concerns and contribute to project planning. Climate-Resilient Practices: Promote climate-smart practices such as crop diversification, agroforestry, and water conservation. Highlight the benefits of sustainable practices for both women and men—Gender-Responsive Extension Services: Tailor extension services to address the specific needs of women farmers. Provide information on climate adaptation, pest control, and market linkages. Market Access and Value Addition: Facilitate women's access to cotton markets. Promote value addition through processing and marketing initiatives. Gender-Responsive Policies: Advocate for policies explicitly addressing gender equality in cotton production. Ensure that climate adaptation strategies consider gender-specific vulnerabilities. Gender equality is a matter of social justice and a prerequisite for sustainable cotton production. By integrating gender-responsive approaches, Kisumu can enhance cotton resilience, improve livelihoods, and contribute to achieving the Sustainable Development Goals (SDGs)

- Religion and cultural beliefs affect the sustainability of cotton production in varying degrees according to one's Religion and beliefs. Governments should consider diversifying cotton production through targeted policies to maximize economic benefits. Environmental degradation and energy poverty are critical factors that need to be addressed in sustainable

cotton production. Cultural beliefs influence cotton demand, while cotton production impacts economic growth. Recognizing these connections can guide policies and strategies for sustainable development. Therefore, empowerment, awareness creation, and attitude change should be advocated through training, programs, and adult education. The government should also develop community development activities and sensitization concerning Religion and cultural beliefs that enlighten members of society about some adverse effects of certain cultural beliefs. Community Engagement and Education: Engage religious leaders to promote sustainable practices. Organize workshops on climate-smart farming, emphasizing cultural values. Integrate traditional crop rotation practices. Advocate for the use of cultural methods for pest management. Encourage women's active involvement in decision-making. Land Ownership: Promote women's land ownership rights. Local Markets: Strengthen local markets for cotton products.Traditional Textiles: Explore value addition through traditional textile production. Climate-Resilient Practices: Drought-Tolerant Varieties: Cultivate cotton varieties suited to local climate conditions. Water Conservation: Promote cultural practices that conserve water.Cultural Heritage Protection: Integrate cotton farming into cultural heritage policies. Collaborate with religious institutions for sustainable cotton promotion. Sustainable cotton production in Kisumu requires a holistic approach that respects cultural beliefs, empowers women, and aligns with religious values. We can create a vibrant cotton sector that benefits people and the environment by bridging tradition and innovation.

- On marketing and distance from buying centers, it is recommended that collection and buying centers be placed closer to the producers. The County Government should revive and strengthen weak cotton cooperative societies in Kisumu and support the

cooperatives to ensure their smooth running. Doing so will help cotton farmers join and benefit from the cooperatives. The National Government should spearhead the revival of the closed cotton ginnery in Kisumu to facilitate cotton farmers' market supply. This will also eliminate brokers or intermediaries, giving farmers maximum profits. There should be policy reforms that would stabilize prices and coordinate support services. Cotton has deep cultural significance in many societies. It is often associated with purity, tradition, and heritage. In various cultures, cotton garments are worn during important ceremonies and festivals. These cultural beliefs influence the demand for cotton products, affecting local consumption and export markets.

- The study recommends that the government establish Satellite Buying Centers and create smaller buying centers closer to cotton-producing areas. This reduces transportation distances and costs for farmers. Introduce mobile buying units that visit remote villages. Farmers can sell their cotton locally, minimizing travel. Provide subsidies for transportation costs. Encourage farmers to sell their cotton promptly. Educate farmers about buying center locations and schedules. Improve communication channels to reduce uncertainty. Form cooperatives or producer groups. Pool resources for bulk transportation to buying centers. Promote local ginning and processing units. Reduce the need for long-distance transportation. Strengthen connections between buying centers and textile industries. Ensure a steady demand for locally produced cotton. The distance from buying centers significantly influences the sustainability of cotton production in Kisumu. By implementing targeted interventions, such as establishing satellite centers and improving transportation, we can enhance livelihoods, reduce costs, and promote a thriving cotton sector.

- Thirdly, regarding interventions, developing economies and Kisumu County should embrace new technologies and significantly genetically modified seed varieties. This would need developing the right legal and regulatory framework in addition to doing in-depth study to discover cultivars suitable for the local growing circumstances. The government should also advocate for a Balanced Approach: Combine GM traits with conventional breeding. Avoid overdependence on a single technology. Other government involvements recommended by the study include educating farmers on GM technology and its benefits. Address misconceptions and build trust. Develop GM varieties suited to Kisumu's specific conditions. Consider drought tolerance and pest resistance. Regularly assess environmental and health risks. Monitor potential gene flow and unintended effects. Community Engagement: Involve local communities in decision-making. Address cultural beliefs and concerns. GM seed varieties and other interventions offer opportunities for sustainable cotton production in Kisumu. We can balance productivity and environmental stewardship by integrating technology, education, and community involvement.

- To ensure a sustainable future, we must reimagine cotton production, embracing practices that balance productivity, environmental stewardship, and social equity. Improved access to international markets can significantly impact cotton production and enhance individuals' livelihoods. Government funding for export activities in collaboration with international organizations would facilitate this.
- Promoting community-led projects addressing local issues can empower locals to assume responsibility for sustainable cotton production practices. Community-based

initiatives that engage farmers in the decision-making processes of sustainability can foster a sense of accountability and dedication.

- Investigations into novel agricultural technology, including precision agriculture, should be considered to improve resource efficiency and yields. Educating farmers on the optimal utilization of this technology may enhance productivity while ensuring sustainability.

- Moreover, sustainable supply chains that promote ethical sourcing and environmental stewardship should be established to enhance the overall sustainability of cotton production.

- Implementation of drought-resistant agricultural practices and enhancements in water management that may alleviate specific adverse effects of climate change on cotton cultivation.

- Advocating for favorable agricultural policy for sustainability concerns that impact cotton farmers. This will entail policymakers' involvement and efforts toward enacting favorable legislation that fosters an atmosphere conducive to the flourishing of sustainable practices. Campaigns that enhance consumer understanding of environmental problems should be done to promote improved purchase decisions that may benefit local cotton growers.

- A comprehensive understanding of the entire value chain, from production to processing and marketing, will enable stakeholders to identify where targeted interventions are necessary.

- Advocating resilient agricultural methods, including crop rotation and intercropping, will address soil health and resistance to pests and diseases.

- Enhancing farmer organizations will facilitate advocacy for farmers' interests and requirements, improving the efficacy of sustainable cotton production programs. Strong agricultural organizations can facilitate collective action and resource aggregation.

- Implementing efficient monitoring and evaluation procedures will guarantee that sustainable cotton production is effective and responsive while facilitating periodic assessments of progress, challenges encountered, and opportunities for enhancement.

- Advancement of fair-trade principles in the cotton industry will significantly benefit farmers by improving their lives and implementing sustainable production methods. Fairtrade projects provide justifiable support for ethical sourcing and community development.

- Public-private collaboration can leverage resources and knowledge to promote sustainable cotton production efforts. Private sector partners' participation can expedite innovation and enhance market access for cotton producers.

- Tactics that encompass low water usage and a reduction in chemical inputs, among other measures, will mitigate the environmental impact of cotton production.

- Long-term sustainability goals established for cotton production will motivate stakeholders to adhere to sound environmental and social standards across the supply chain. These objectives must align with diverse national and international sustainability frameworks, including the Sustainable Development Goals (SDGs).

- Sustainable cotton production in Kisumu County necessitates stakeholder collaboration incorporating all social, economic, and environmental factors. Focused interventions within the community, grassroots involvement, and the promotion of

innovative practices will ensure the comprehensive development of a dynamic, sustainable cotton sector in Kisumu, benefiting the local populace and the environment.

- Programs that educate women about their health, rights, and enterprise development be established and advocating for gender-disaggregated data collection be enabled to tackle the distinct issues women encounter in cotton.

- Integrating traditional practices with contemporary agricultural techniques will be necessary to secure community support and enhance the efficacy of initiatives.

- The primary concern in sustainable cotton production is economic dynamics. Marketing issues can be resolved by establishing collection and purchasing hubs close to the producer. This would save transportation expenses while also enhancing farmers' access to markets. Robust cotton cooperative organizations can furnish support networks to farmers through collaboration and resource sharing.

- The resurrection of the closed Kisumu cotton ginnery will be crucial in optimizing the value chain. Eliminating intermediaries will enable farmers to obtain fair pricing for their produce. This requires policies that stabilize mechanisms for coordinating support services, ensuring farmers' success in a competitive market.

- Interventions and technological integration will ensure sustainable cotton production**.** Genetically modified seed varieties have the potential to enhance the sustainability of cotton production. A robust legislative and regulatory framework that fosters research and development be built while safeguarding fundamental environmental and health safety standards. Farmers should learn about the advantages of GM technology and its safety to foster confidence and encourage the adoption of new methods. A technique that integrates genetically modified features with traditional breeding will balance this,

reducing the dangers of excessive reliance on a single technology. This would enable farmers to gain from enhanced crop resilience while preserving traditional farming practices that have supported communities for generations.

- Sustainable cotton production is not an isolated endeavor but a collective responsibility. By embracing innovation, empowering communities, and safeguarding our planet, we can weave a fabric of resilience and prosperity that honors the cotton plant and the hands that nurture it. Let us stitch together a sustainable future, thread by thread.

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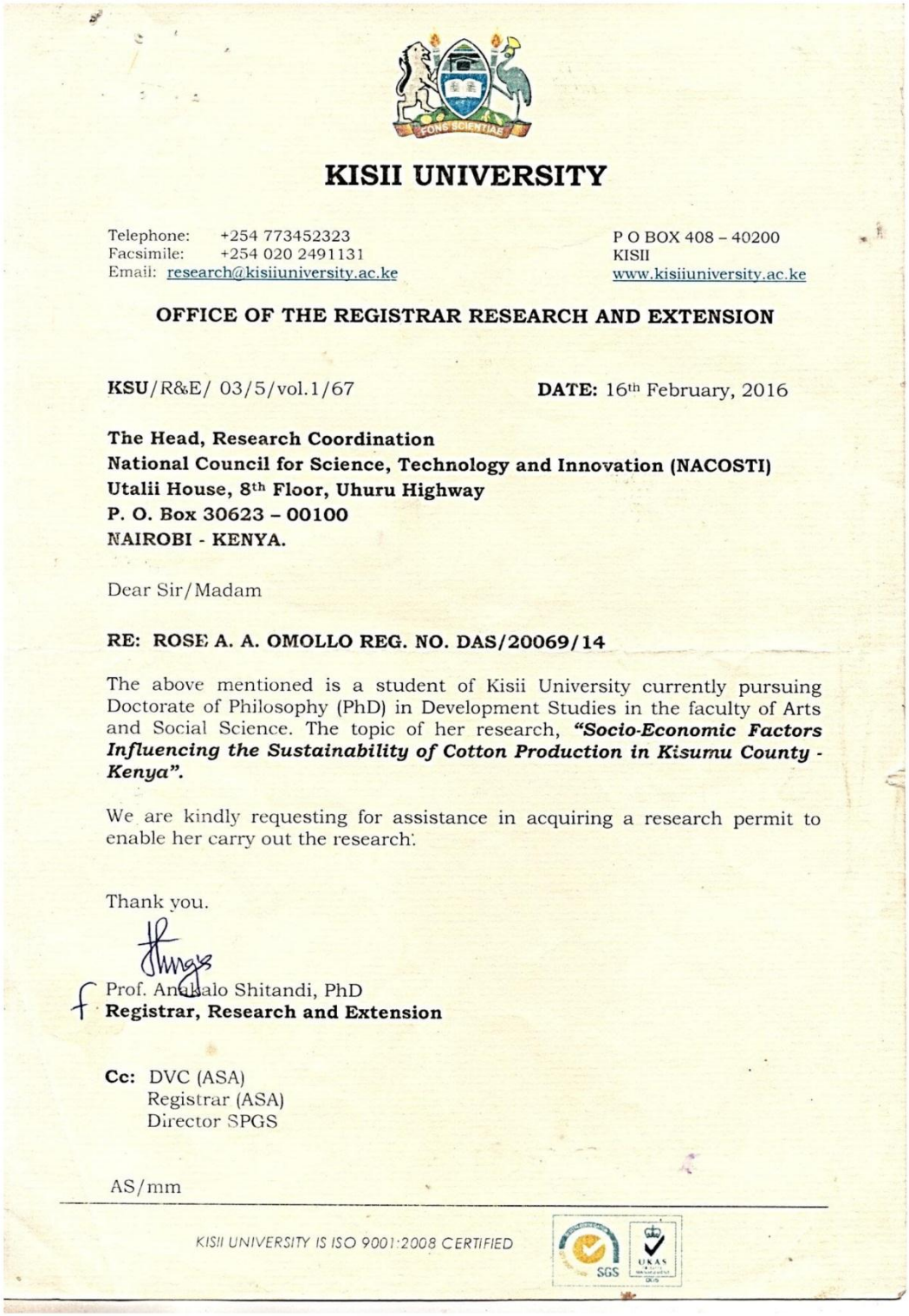
APPENDICES

Appendix I: Kisii University Research Authorization.



KISII UNIVERSITY

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Facsimile: +254 020 2491131
Email: research@kisiiuniversity.ac.ke

P O BOX 408 – 40200
KISII
www.kisiiuniversity.ac.ke

OFFICE OF THE REGISTRAR RESEARCH AND EXTENSION

KSU/R&E/ 03/5/vol.1/67 **DATE:** 16th February, 2016

The Head, Research Coordination
National Council for Science, Technology and Innovation (NACOSTI)
Utalii House, 8th Floor, Uhuru Highway
P. O. Box 30623 – 00100
NAIROBI - KENYA.

Dear Sir/Madam

RE: ROSE A. A. OMOLLO REG. NO. DAS/20069/14

The above mentioned is a student of Kisii University currently pursuing Doctorate of Philosophy (PhD) in Development Studies in the faculty of Arts and Social Science. The topic of her research, ***"Socio-Economic Factors Influencing the Sustainability of Cotton Production in Kisumu County - Kenya".***

We are kindly requesting for assistance in acquiring a research permit to enable her carry out the research.

Thank you.

Prof. Anakalo Shitandi, PhD
Registrar, Research and Extension

Cc: DVC (ASA)
Registrar (ASA)
Director SPGS

AS/mm

KISII UNIVERSITY IS ISO 9001:2008 CERTIFIED

Appendix II: NACOSTI Research Authorization.

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. NACOSTI/P/16/95852/11171

Date: 22nd June, 2016

Rose Agina A. Omollo
Kisii University
P.O. Box 402-40800
KISII.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Socio-economic factors influencing the sustainability of cotton production in Kisumu County,"*** I am pleased to inform you that you have been authorized to undertake research in **Kisumu County** for the period ending **21st June, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Kisumu 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.

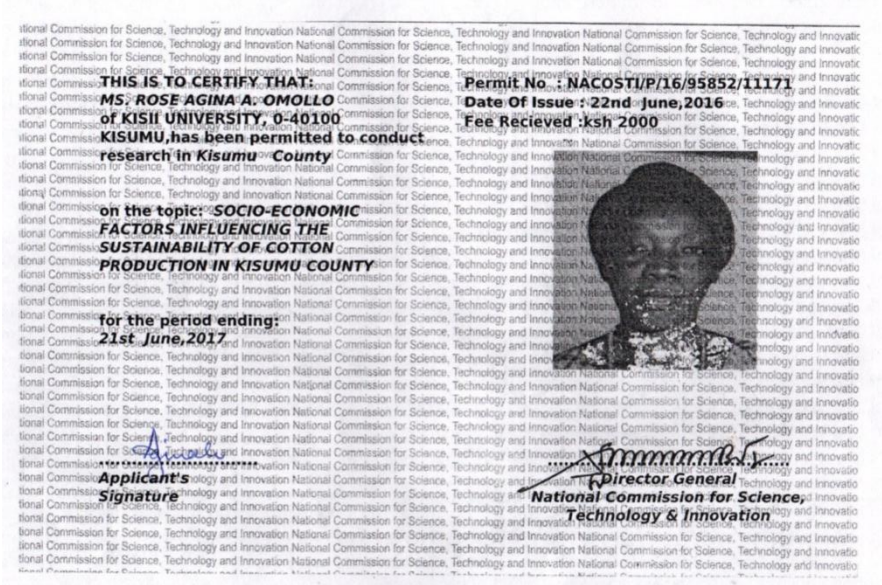
BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kisumu County.

The County Director of Education
Kisumu County.

Appendix III: NACOSTI Permit.

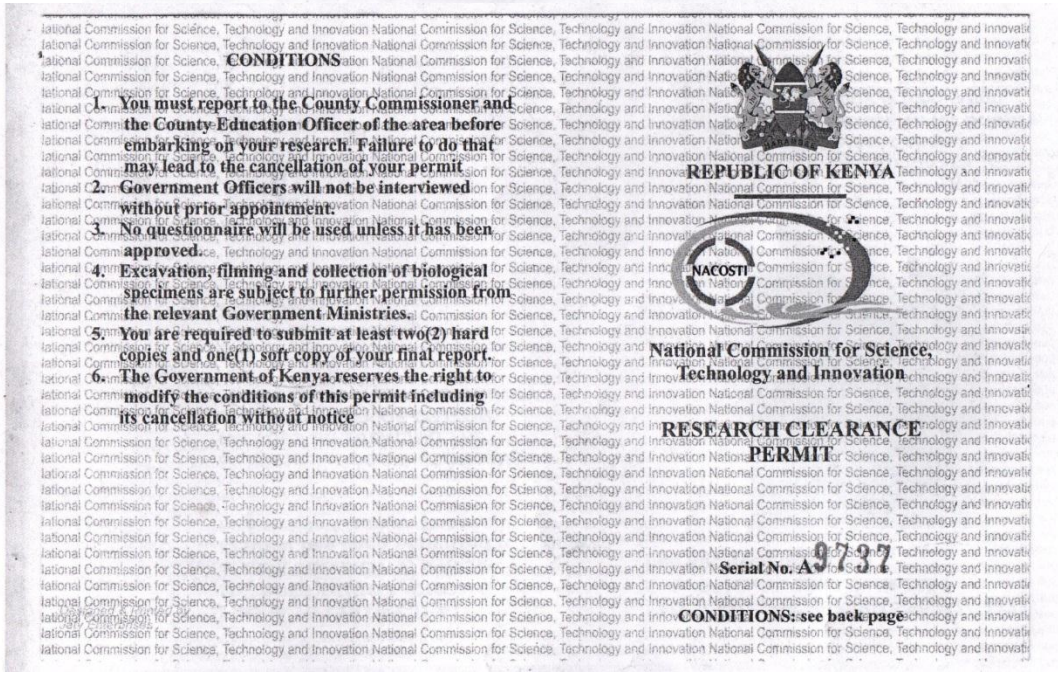


THIS IS TO CERTIFY THAT:
MS. ROSE AGINA A. OMOLLO
of KISII UNIVERSITY, 0-40100
KISUMU,has been permitted to conduct
research in *Kisumu County*
on the topic: *SOCIO-ECONOMIC FACTORS INFLUENCING THE SUSTAINABILITY OF COTTON PRODUCTION IN KISUMU COUNTY*
for the period ending:
21st June,2017

Permit No : NACOSTI/P/16/95852/11171
Date Of Issue : 22nd June,2016
Fee Recieved :ksh 2000

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation



CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

NACOSTI

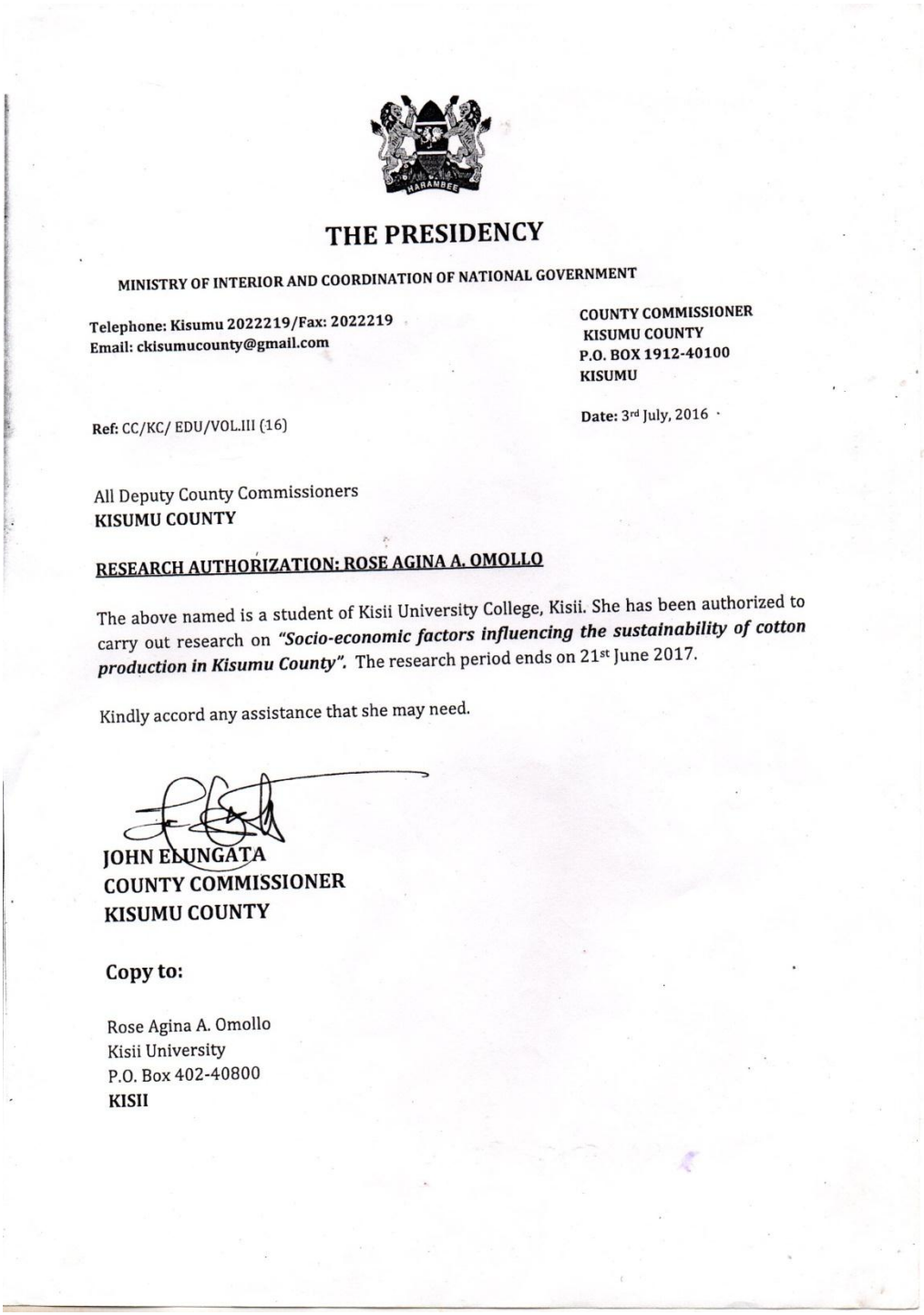
National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 9737

CONDITIONS: see back page

Appendix IV: The Presidency Research Authorization.



THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telephone: Kisumu 2022219/Fax: 2022219
Email: ckisumucounty@gmail.com

COUNTY COMMISSIONER
KISUMU COUNTY
P.O. BOX 1912-40100
KISUMU

Ref: CC/KC/ EDU/VOL.III (16)

Date: 3rd July, 2016

All Deputy County Commissioners
KISUMU COUNTY

RESEARCH AUTHORIZATION: ROSE AGINA A. OMOLLO

The above named is a student of Kisii University College, Kisii. She has been authorized to carry out research on ***"Socio-economic factors influencing the sustainability of cotton production in Kisumu County".*** The research period ends on 21st June 2017.

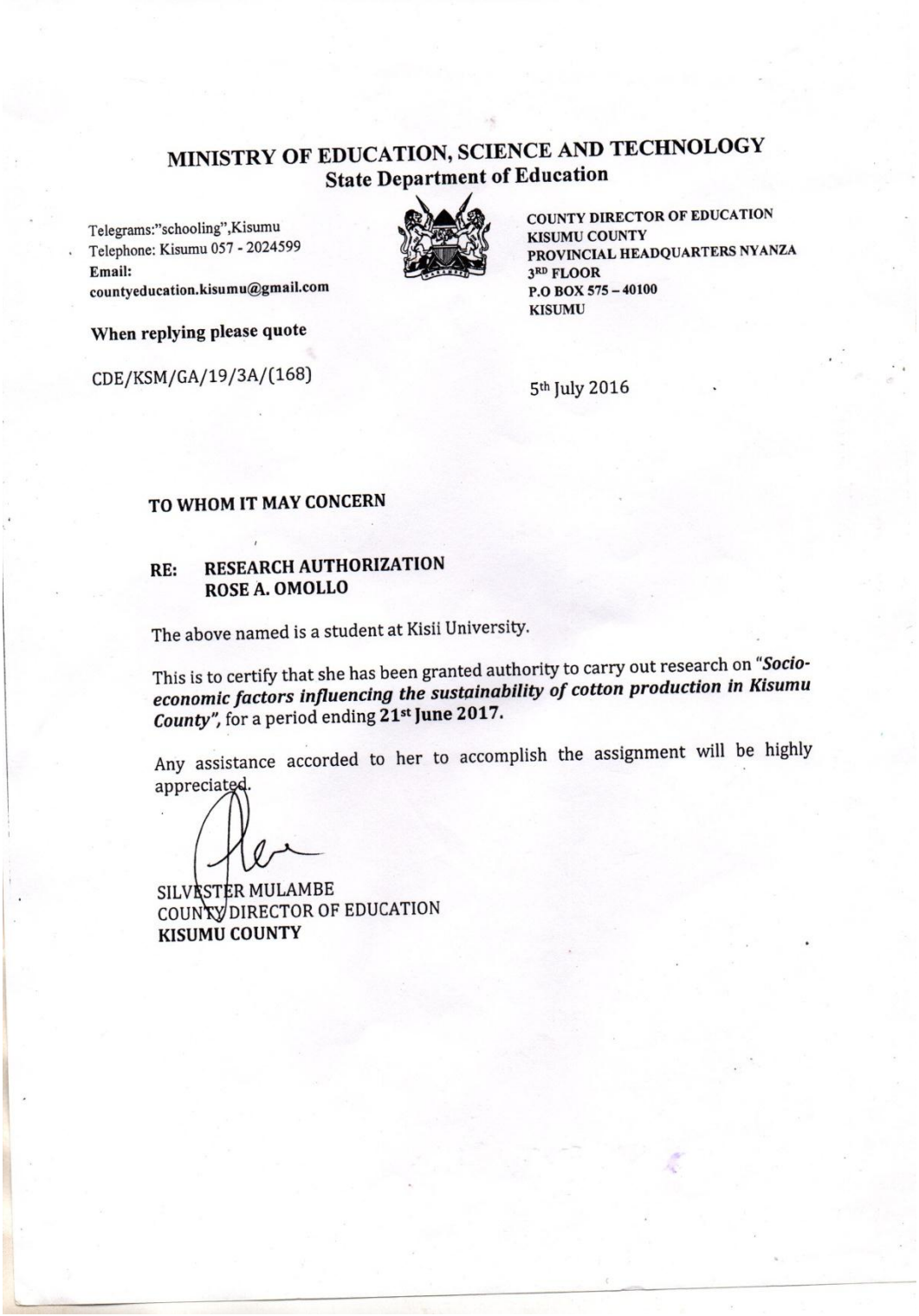
Kindly accord any assistance that she may need.

JOHN ELUNGATA
COUNTY COMMISSIONER
KISUMU COUNTY

Copy to:

Rose Agina A. Omollo
Kisii University
P.O. Box 402-40800
KISII

Appendix V: Ministry of Education, Science and Technology Research Authorization.



MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
State Department of Education

Telegrams:"schooling",Kisumu
Telephone: Kisumu 057 - 2024599
Email:
countyeducation.kisumu@gmail.com

When replying please quote

CDE/KSM/GA/19/3A/(168)

COUNTY DIRECTOR OF EDUCATION
KISUMU COUNTY
PROVINCIAL HEADQUARTERS NYANZA
3RD FLOOR
P.O BOX 575 – 40100
KISUMU

5th July 2016

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION
ROSE A. OMOLLO

The above named is a student at Kisii University.

This is to certify that she has been granted authority to carry out research on ***"Socio-economic factors influencing the sustainability of cotton production in Kisumu County"***, for a period ending **21st June 2017.**

Any assistance accorded to her to accomplish the assignment will be highly appreciated.

SILVESTER MULAMBE
COUNTY DIRECTOR OF EDUCATION
KISUMU COUNTY

Appendix VI: Questionnaire Cover Letter

Omollo Rose Aginah Atieno

P.O Box 4394- 40103,

Kisumu.

Dear Respondent,

My name is Omollo Rose Aginah Atieno a Ph.D student at Kisii University. I am undertaking research entitled Socio-economic factors influencing the sustainability of cotton production in Kisumu County, Kenya, under the School of Business. I wish, therefore, to request that you find time to complete the questionnaire for this study.

Your participation in the research exercise is voluntary. All information provided will be treated confidentially and utilized only for the study purpose.

Therefore, may I wish you luck as you embark on this exciting academic journey?

Kind regards,

Omollo Rose Aginah Atieno (Adm. No. DAS/60094/2014)

Mobile Number: 0724 581 822, Email: Roseagina@gmail.com

Appendix VII: Questionnaire

This questionnaire collects data on the socio-economic factors influencing the sustainability of cotton production in Kisumu County, Kenya. Therefore, I would be grateful if you could find time to complete the attached questionnaire.

The list of participants was numbered from 1 - 293

Section I: Religion

Please rate your level of agreement with the following assertions about your religion on the attached scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

S/N	Religion Dimension	1	2	3	4	5
1	Religion guides my farming behaviour					
2	My farming ethics are guided by my religion					
3	I believe in the supernatural					
4	Religious beliefs guide my assessment of truth					
5	I have a faith I ascribe to					

Section II: Cultural Beliefs

Please rate your level of agreement with the following assertions about your culture on the attached scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Cultural Beliefs Dimension	1	2	3	4	5
6	There are certain accepted farming norms					
7	Social learning has affected my behavior in society					
8	My material resources are symbolic of our culture					
9	There is a popular way of doing things in our community					
10	I ascribe to certain traditions in my community					

Section III: Gender Issues.

Please rate your level of agreement with the following statements about your gender on the attached scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Gender Dimension	1	2	3	4	5
11	I am conscious of my biological sex					
12	There are sex based social characteristics					
13	My gender determines my role in agriculture					
14	There is a social construction in our community on what gender roles entail					
15	Biological differences influence formation of gender identity					

Section IV: Marketing.

Please rate your level of agreement with the following assertions about your marketing using the attached scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Marketing Dimension	1	2	3	4	5
16	Exchange relationships are determined in the market					
17	Attention is paid to customer satisfaction					

18	Marketing our products is our core functions					
19	We advertise our products					
20	There is marketing department					

Section V: Distance from buying centres.

Please rate your level of agreement with the following assertions about your distance using the supplied scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Distance Dimension	1	2	3	4	5
21	We prefer closer location to the target industry					
22	Our location influences our site					
23	Our location determines our economic activity					

Section V1: Farm Factors.

Please rate your level of agreement with the following statements on your agricultural variables using the supplied scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Farm Factor Dimension	1	2	3	4	5
24	The number of employees is adequate for tasks in this company					
25	The assets in this farm is in tandem with our costs					
26	Sizeable market share is commanded locally					

Section VII: Sustainability of Cotton Production

Please rate your level of agreement with the following statements on the sustainability of cotton production in your zone using the supplied scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Sustainability of Cotton Production Dimension	1	2	3	4	5
27	There is improved profitability					
28	The long term prospects in this sector looks bright for our					

	firm					
29	Our production levels have improved.					

Section VIII: Interventions in place

Please rate your level of agreement with the following statements on the sustainability of cotton production in your zone using the supplied scale. Strongly Disagree =1 Disagree=2 Neutral=3 Agree=4 Strongly Agree=5 (Mark only one response.)

	Interventions	1	2	3	4	5
30	There are interventions that advice my cotton farming activities					
31	The interventions have helped me increase my yields in cotton					
32	The interventions are socio-culturally acceptable					

Appendix VIII: List of Participating Entities in Kisumu, Kenya

(The section was numbered 1 – 220 for cotton producers, 221 – KALRO,222 – CODA, 223 – 227 Agriculture extension staff, 228- 232 Existing Cooperatives' officers, 233 – Cooperative department office, 234 female youth farmer, 235 male youth farmer, 235 – 240 Administrative staff.)

S/N	Name	Sub County	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

11			
12			
13			
14			
15			
16			
17			
18			
240			

Rate of Response

Questionnaire category	Frequency	Percent
Filled and returned	267	91.12
Not returned	36	8.88
Total	293	100

APPENDIX VIII: PLAGIARISM REPORT

Bidian Moseti

INFLUENCE OF SOCIO-ECONOMIC FACTORS ON SUSTAINABLE PRODUCTION OF COTTON IN KISUMU COUNT...

INFLUENCE OF SOCIO-ECONOMIC FACTORS ON SUSTAINABLE PRODUCTION OF COTTON IN KISUMU COUNTY, KENYA

Postgraduate

Kisii University

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