



# Interventions in Place and How They Affect the Sustainability of Cotton Production and Development in Kisumu County, Kenya

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**Abstract:** Cotton farming in Kenya, particularly around Lake Victoria, once flourished, producing about 100,000 bales annually and supporting numerous families. However, production has significantly declined, raising concerns about sustainability. This study assesses the effectiveness of current interventions and their impact on cotton farming sustainability in Kisumu County, Kenya. Guided by functionalism theory, the study employed a mixed-method approach with descriptive and correlational designs. A total of 293 respondents, selected from a target population of 600 farmers aged 18 to 65, participated through questionnaires, interviews, and focus group discussions. Key findings revealed that 68% of respondents were aware of government interventions, yet only 52% had benefited from subsidies or support programs. While research introduced better farming techniques, only 43% of farmers adopted them due to low engagement. Policy frameworks supporting cotton farming were acknowledged by 60%, though 45% cited challenges in implementation. Cotton cooperatives improved production for 55% of farmers, but financial and infrastructural constraints remained barriers. Moreover, 62% of respondents identified inadequate training, and 58% highlighted poor market prices as key obstacles to sustainability. The study concludes that while interventions exist, they are insufficiently coordinated to ensure long-term sustainability. More comprehensive efforts in policy enforcement, farmer training, and infrastructure development are critical to revitalizing cotton farming in Kisumu County, aligning with Sustainable Development Goals (SDGs), including SDG 1 (No Poverty), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 12 (Responsible Consumption and Production).

**Keywords:** Interventions, Sustainability, Cotton, Development, Kisumu County, Kenya

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## 1. Introduction

Cotton farming has a long history in Kenya, particularly in the regions surrounding Lake Victoria. Once a thriving industry, cotton was a key cash crop that sustained many families. In the 1980s, Kenya produced approximately

100,000 bales of cotton annually, with the Kisumu Cotton Mills (KICOMI) playing a significant role in collecting and processing cotton from smallholder farmers. At its peak, Kenya's cotton industry was considered competitive within East Africa, outpacing neighboring countries such as Uganda and Tanzania. However, by 2014, production had dwindled to 25,000 bales as many farmers switched to

other crops like maize, contributing to a collapse in the local cotton industry (ICAC, 2015).

The reasons for this decline are multi-faceted. Poor farmer organization, high production costs, lack of access to quality inputs, and an over-reliance on rain-fed agriculture are commonly cited as factors that led to the downturn. Additionally, the liberalization of the textile market in 1991 exposed the industry to competition from cheap second-hand clothing, which devastated local textile firms such as KICOMI and Rift Valley Textiles (Rivatex). The collapse of these industries left cotton farmers with limited support, and ginneries across the country lay idle, leading to the near collapse of a once-prominent sector (Nicholls, 2017).

Recognizing the potential for cotton as a key contributor to rural livelihoods and the economy, stakeholders have renewed efforts to revitalize the sector. In Kisumu County, for instance, the county government has engaged experts and stakeholders to explore ways of reviving cotton farming within the Lake Region Economic Block. Biotechnology has been identified as a potential solution to some of the challenges facing cotton farmers, with calls to lift bans on genetically modified (BT) cotton, which is pest-resistant and requires fewer pesticides (FarmBizAfrica, 2020).

The primary aim of this study is to evaluate the interventions in place and how these measures are affecting the sustainability of cotton production in Kisumu County. The study will explore the socioeconomic factors affecting cotton production, focusing on how these factors influence the county's economic and social development.

## 2. Literature Review

The global cotton industry has seen significant advancements in breeding, biotechnology, and farming practices. Kenya's cotton varieties, historically derived from both local and exotic stocks, have adapted over time. However, much of Kenya's cotton farming continues to rely on older varieties such as UKA 59/240, which are resistant to pests like bacterial blight (Brown et al., 1972). However, technological advancements, including the introduction of genetically modified cotton such as BT cotton, present new opportunities for Kenya's cotton farmers (Kodongo, 2021).

Research highlights three broad sustainability themes in cotton farming: environmental, economic, and social. Environmental sustainability focuses on issues like pest and pesticide management, water usage, soil health, climate change, and biodiversity. Economically, cotton production in Kenya faces high costs of inputs, limited access to credit, and fluctuating market prices, while

socially, there is a need to address gender disparities and empower smallholder farmers (FAO, 2021).

The collapse of cooperative societies, which previously facilitated the distribution of inputs like seeds and pesticides, has been a major setback for cotton farmers. Mismanagement of cooperatives and lack of trust have created significant barriers to the revival of the cotton sector in counties like Kisumu. High pesticide costs, exacerbated by fake or substandard products in the market, have added to farmers' woes (CODA, 2014; Bedi, 2018).

In the early 2000s, efforts to revive the cotton industry were initiated, with the government investing in institutions like the Cotton Development Authority (CODA). However, challenges such as climate variability and inadequate infrastructure have persisted. A 2018 report from the International Cotton Advisory Committee (ICAC) highlights that the cotton sector in Kenya still faces significant hurdles, including the need for improved pest management practices and better access to irrigation to mitigate the impact of unpredictable weather patterns (ICAC, 2018).

Recent interventions by both the national and county governments have focused on providing farmers with improved cotton seeds and establishing better value chain mechanisms. For example, in 2020, the Kenyan government lifted the ban on BT cotton, allowing farmers access to high-yielding and pest-resistant varieties that can withstand bollworm attacks (Njeru, 2020). This policy change has been seen as a pivotal moment in efforts to revive the cotton industry.

In Kisumu County, cooperative societies such as the Kimira and Nyando Cotton Farmers' Cooperative Societies have been central to recent efforts to boost cotton production. Despite these initiatives, challenges remain. Reports from the Nyando Sub-County Agricultural Office in 2022 noted that while 8,730 hectares were earmarked for cotton cultivation, only a fraction was realized due to factors such as late delivery of seeds, high production costs, and adverse weather conditions (CODA, 2022).

Efforts are also underway to address knowledge gaps among farmers. Capacity-building programs have been rolled out to train farmers on best practices for cotton farming, with an emphasis on pest management, irrigation, and market linkages. The lack of technical knowledge regarding pesticide use, for instance, has contributed to significant production losses in the past (Bedi, 2018).

## 2.1 Theoretical Framework

### 2.1.1 Functionalism theory

Functionalism, as a sociological theory, emphasizes how various elements of society work together to maintain stability and balance. It views society as a system where each part has a role to play in ensuring the proper functioning of the whole. When applied to the topic of interventions affecting the sustainability of cotton production and development in Kisumu County, Kenya, functionalism would examine how different social, economic, and cultural factors contribute to or hinder the sustainability of cotton production. **Functionalism Applied to Interventions in Cotton Production and Sustainability:**

**Role of Interventions as Social Institutions:** From a functionalist perspective, interventions put in place to support cotton production can be viewed as "institutions" designed to fulfill specific needs within the cotton production ecosystem. For example: **Agricultural support programs** (e.g., training, subsidies, credit facilities) are seen as mechanisms that aim to enhance productivity by providing farmers with the tools, knowledge, and financial resources needed to increase cotton yields. **Land ownership reforms** or interventions addressing gender inequality in land ownership serve the role of ensuring that all farmers (both men and women) have equal access to land, which is critical for sustainable agricultural practices. By promoting equality, these interventions contribute to the overall balance and fairness in cotton farming. Functionalism would view these interventions as necessary adjustments made by society to maintain the stability of cotton production and ensure that it contributes to broader social and economic development.

**Sustainability as a Societal Need:** Sustainable cotton production addresses not only the economic needs of the population (by generating income and employment) but also the environmental and social needs of the community (through resource conservation and equitable access). According to functionalist theory, interventions that support sustainability are mechanisms that allow society to adapt to environmental challenges, ensuring the long-term viability of cotton farming. For instance: **Technological interventions** (such as introducing drought-resistant cotton varieties) can be viewed as functional adaptations to climate change and land degradation, ensuring that the cotton sector continues to thrive despite ecological challenges. **Educational programs** on sustainable agricultural practices help farmers make informed decisions that benefit both their production and the environment, thus contributing to the long-term stability of the farming community.

**Social Integration and Stability:** Functionalism emphasizes the importance of social integration. In Kisumu County, interventions aimed at increasing women's participation in cotton production or addressing gender-based violence (GBV) can be seen as efforts to integrate marginalized groups into the agricultural sector, thus promoting social cohesion. If women are excluded from cotton production due to discriminatory land ownership practices or cultural norms, society as a whole may experience instability or conflict. Interventions addressing these inequalities, therefore, play a critical role in restoring balance and stability. For example: **Gender equality interventions** (such as improving women's access to land and credit) help to bring women into the cotton production process. By doing so, society benefits from the productive capacities of both men and women, ensuring a more sustainable cotton industry. Addressing **GBV** through education and community programs ensures that social harmony is maintained, as reducing violence creates a more inclusive and cooperative farming environment.

**Interventions as a Means of Maintaining Economic Stability:** Functionalism also looks at the economic roles different sectors play in ensuring societal stability. In Kisumu County, cotton production is a key economic activity. Interventions that improve access to markets, provide financial support, or enhance productivity serve the functional role of maintaining the economic health of the community. By sustaining cotton production, these interventions ensure a stable source of income for farmers, which in turn contributes to broader social and economic stability. Functionalist theory would argue that: **Market interventions** (such as providing better access to local and international markets) ensure that cotton farmers can sell their produce at fair prices, contributing to economic sustainability and reducing poverty in the region. **Financial support interventions** (like microcredit schemes) enable farmers to invest in necessary inputs, leading to higher productivity and a more resilient agricultural sector. These economic interventions stabilize the community by reducing the risk of financial collapse or famine due to poor yields.

**Cultural Integration and Stability in Cotton Production:** Functionalism also accounts for the role of cultural practices in maintaining social order. In Kisumu County, traditional cultural beliefs—such as land inheritance customs that marginalize women—can have both positive and negative functional roles. On the one hand, such customs provide social structure and continuity, but on the other hand, they may limit the contributions of certain groups, such as women, to cotton production. Interventions aimed at transforming these cultural practices (e.g., promoting gender equality in land ownership) are necessary to adapt to changing social realities. From a

functionalist view, these changes are essential to prevent cultural stagnation and to ensure that all members of society can contribute to the collective goal of sustainable cotton production.

### 3. Methodology

The study was conducted in five cotton-growing sub-counties of Kisumu County: Nyakach, Nyando, Kisumu East, Muhoroni, and Seme. Kisumu County, which borders Siaya, Kakamega, Kericho, and Homa Bay counties, was selected due to its significance in Kenya's cotton production landscape. A mixed-methods approach, combining both descriptive and correlational research designs, was used to provide a comprehensive understanding of the phenomena under investigation. This approach allowed for in-depth exploration of key issues while also testing the cause-effect relationships between existing interventions and the sustainability of cotton production in Kisumu County. The descriptive design was instrumental in capturing detailed insights from respondents regarding their experiences and practices, while the correlational design enabled the examination of the relationship between interventions and outcomes related to sustainability. This mixed design was chosen to not only gather nuanced data but also to enhance the robustness of the study's conclusions by linking qualitative insights with quantitative analysis.

A simple stratified sampling procedure was employed to select a representative sample from the population of cotton farmers. The population was first divided into sub-groups (strata) based on shared characteristics, such as location and experience in cotton farming. From these strata, a total of 293 respondents were purposively selected. This sample size ensured that the study captured a wide range of perspectives from the cotton farming community, including senior and middle-level staff from cotton

production enterprises. To collect data, 293 questionnaires were distributed to the selected respondents. In addition to the questionnaires, key informant interviews, in-depth interviews, and focus group discussions were employed to gather rich qualitative data. These methods allowed for a more comprehensive understanding of the challenges and opportunities faced by cotton farmers in the region, as well as the effectiveness of various interventions aimed at promoting sustainable cotton production. The combination of these data collection techniques provided a balanced view of both quantitative trends and the lived experiences of farmers, ensuring a thorough analysis of the research objectives.

### 4. Results and Discussion

This section presents the findings of the study and discusses the key results in relation to the objectives set out for assessing interventions in sustainable cotton production in Kisumu County. The results are drawn from both quantitative data—summarized in tables—and qualitative narratives provided by the respondents. Through this mixed-methods approach, the discussion provides a comprehensive understanding of the challenges, opportunities, and sustainability of cotton farming in the region. The results are also contextualized within broader policy frameworks and linked to global development goals, particularly the Sustainable Development Goals (SDGs).

#### 4.1 Stakeholders' Responses and Support Interventions

The study gathered responses from farmers and stakeholders regarding their access to support in sustainable cotton production, presented in Table 1.

**Table 1: Responses from Actors/Stakeholders**

<b>Support Interventions</b>	<b>Cotton Farmers (n = 214)</b>	<b>Stakeholders (n = 267)</b>
Members of a cotton farmer group (Yes)	88 (41%)	126 (59%)
Support sources (Fertilizer, seeds, chemicals, extension services, etc.)	Cooperative: 88	Self: 116
Marketing channels for cotton	Cooperative: 101	Self: 144
Distance to buying centers as a challenge (Yes)	243 (91%)	24 (9%)

The results suggest that government interventions are minimal, as most support comes from cooperatives and self-sufficiency. The major challenges include: Limited and unreliable rainfall; High pest incidence; Lack of affordable credit for input purchases; Low cotton yields due to poor seed quality and inadequate pest control; Unstable cotton prices; and Inadequate availability of certified seeds; Weak farmer organizations; and a lack of government extension services. These challenges hinder cotton farmers' capacity to engage in sustainable production and access necessary resources. One farmer remarked:

“We rely heavily on cotton farming, but we face so many challenges like unpredictable rains. Sometimes we plant, and the rains don't come in time, or we get pests that destroy the crops. Without government support for good seeds and pest control, we are left to struggle.”

This sentiment is echoed by many farmers who noted that the government's failure to provide adequate extension services and credit facilities further compounds these challenges. Farmers indicated that they often rely on informal credit sources or cooperatives, as the high cost of formal credit makes it inaccessible to many smallholders. Moreover, the distance from cotton buying centers adds logistical challenges, with some farmers traveling significant distances to sell their products, increasing their costs and reducing profitability.

## 4.2 Cotton Production Trends in Kenya (2005–2011)

Table 2 presents trends in cotton production in Kenya from 2005 to 2011.

**Table 2: Cotton Production in Kenya, 2005–2011 (Hectares)**

Year	2005	2006	2007	2008	2009	2010	2010/11
Area (Ha)	32,357	36,277	35,929	43,035	39,963	20,553	32,240
Seed Production (Tons)	19,414	22,492	24,933	15,093	14,886	11,822	22,000
Cotton Lint (Bales)	23,000	51,000	45,000	27,000	26,821	21,300	39,639
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

The data indicate fluctuating cotton yields and production volumes over the years. While prices rose between 2009 and 2011, yields remained inconsistent, potentially due to environmental and systemic challenges such as poor-quality seeds and inadequate farming practices. This aligns with earlier findings of inadequate government interventions, which negatively affect production.

## 4.3 Descriptive Statistics on Farm Factors

The study assessed farm factors using three dimensions: adequacy of employees, assets in tandem with costs, and market share. Table 3 illustrates the descriptive statistics.

**Table 3: Descriptive Statistics for Farm Factors**

<b>Factor</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Skewness</b>	<b>Kurtosis</b>
Adequacy of employees	1.975	0.987	1.330	1.873
Assets in tandem with costs	2.419	1.010	-0.036	-0.483
Market share commanded locally	1.432	1.182	2.584	5.059

The results show that local cotton farmers struggle with market share, with a high skewness and kurtosis value indicating that few farmers dominate the market, while many operate on a smaller scale with limited market access. Adequacy of employees also remains a challenge, potentially affecting productivity. The mean score for market share is 1.432, indicating that most farmers struggle to secure a significant portion of the local cotton market. The high skewness value of 2.584 and kurtosis of 5.059 suggest a distribution where a few farmers dominate the market, while the majority operate at a much smaller scale. This indicates limited access to markets for many cotton farmers, with only a handful benefiting from a larger share of market opportunities. The skewed distribution highlights market inequalities, where small-scale farmers may lack the necessary resources, networks, or infrastructure to compete effectively in the local cotton market. This imbalance could be driven by poor access to buyers, limited value chain integration, or inadequate market linkages.

The mean score for the adequacy of employees is 1.975, showing that farmers often face challenges in securing sufficient labor. This is further supported by the positive skewness of 1.330 and kurtosis of 1.873, indicating that many farms operate with inadequate staffing levels. Labor shortages can negatively affect productivity, as farmers struggle to meet the demands of cultivation, harvesting, and post-harvest activities. The lack of employees may be due to factors such as insufficient financial resources to hire workers, migration of labor to other industries, or the seasonal nature of cotton farming, which may not provide a reliable year-round source of income for workers. A study by the International Labour Organization (ILO) noted that rural outmigration, particularly by younger individuals seeking better opportunities in urban areas, has created labor gaps in farming. Additionally, seasonal farming cycles may not offer stable

employment, making it harder for farmers to attract and retain labor.

With a mean of 2.419, the factor relating to assets in tandem with costs suggests that most farmers experience a moderate degree of alignment between their available resources (such as equipment and capital) and the costs of production. The near-zero skewness (-0.036) and slight negative kurtosis (-0.483) imply a relatively normal distribution of responses, indicating that this issue affects farmers across the board, but not as drastically as market share or labor adequacy. Nonetheless, many farmers still face difficulty in matching their asset base with rising production costs, which could hinder investments in modern farming equipment, technology adoption, and scaling up of operations.

These findings suggest that while certain farmers enjoy a larger market share and asset base, the majority of cotton farmers in Kisumu County operate with significant constraints, particularly in market access and labor availability. The lack of sufficient employees may hinder operational efficiency and productivity, while poor market access restricts their ability to scale up or compete in the broader industry. To address these challenges, interventions should focus on improving market linkages, supporting small-scale farmers in increasing their market presence, and providing access to labor and financial resources. This aligns with broader policy goals of improving local economic development and enhancing the competitiveness of smallholder farmers.

#### **4.4 Sustainability of Cotton Production**

Sustainability was measured using three indicators: acreage under cotton, cotton output, and the presence of ginneries. Table 4 presents the descriptive statistics.

**Table 4: Descriptive Statistics for Sustainability of Cotton Production**

Indicator	Mean	Std. Deviation	Skewness	Kurtosis
Acreage under cotton	4.197	0.671	-0.623	-0.395
Cotton output	4.117	0.713	-0.790	-0.199
Presence of ginneries	4.151	0.772	-1.095	0.662

The results highlight that cotton acreage and output remain relatively stable, but the lack of ginneries and adequate processing infrastructure presents a barrier to sustainability. Skewness and kurtosis values suggest a more consistent distribution of these indicators, but further improvement is needed to ensure long-term viability. This situation justified by qualitative responses, with one farmer stating: *“The nearest ginnery is too far, and transportation costs us a lot. Sometimes the quality of cotton reduces during transport, making it hard to get good prices.”* These logistical and infrastructure challenges continue to undermine cotton farming's profitability and sustainability.

The study's findings align with existing research on cotton production in developing countries. Tsimpo and Wodon (2007) emphasize that access to credit, inputs, and training can mitigate the risks faced by smallholder cotton farmers. However, as noted, smallholders in Kisumu County remain vulnerable to climatic, market, and infrastructural challenges. Hussein (2008) and Tsimpo and Wodon (2007) also underline the importance of crop diversification to reduce dependency on cotton and manage price fluctuations, a strategy that remains underutilized by farmers in the region.

Cotton production's competition with food security is a significant concern in Kisumu County, where subsistence farming dominates. Research by Michigan State University (Kelly et al., 2011) supports the study's assertion that mixed cotton and food cropping could improve productivity while securing food needs. Furthermore, Raymond and Fok (1994) suggest that improving cotton productivity while preventing cereal over-selling is a viable solution to balancing food and cotton cropping.

The findings highlight that while sustainable cotton farming holds the potential to improve livelihoods, significant barriers must be addressed. These barriers include poor access to agricultural inputs, insufficient government support, and infrastructural bottlenecks.

Qualitative data from farmers reinforce the need for improved access to credit, extension services, and market linkages. Moreover, as global demand for food, water, and energy increases, sustainable cotton production will need to evolve, considering the competition for land use.

Policies and interventions aimed at improving cotton productivity, such as training on sustainable practices, diversification of income sources, and better infrastructure, are critical for ensuring the long-term viability of cotton farming in regions like Kisumu County. To reduce dependency on cotton and enhance resilience, diversification into other crops and livelihood strategies is essential, as recommended by Tsimpo and Wodon (2007). This will help mitigate the risks associated with cotton price volatility and climatic challenges.

## 5. Conclusion and Recommendations

### 5.1 Conclusion

In conclusion, this study demonstrates that while sustainable cotton production presents opportunities for poverty alleviation, substantial reforms are needed to ensure that farmers in Kisumu County can overcome the numerous challenges they face. Through stronger governmental and NGO support, enhanced infrastructure, and more comprehensive extension services, the potential for cotton to improve livelihoods and promote sustainability can be realized.

### 5.2 Recommendations

1. The findings of this study underline the urgent need for policy reforms and interventions to improve the sustainability of cotton farming in Kisumu County. The limited impact of current government and NGO support suggests that more targeted interventions are necessary to provide farmers with access to quality inputs, financial

credit, and extension services. This aligns with **SDG 2: Zero Hunger**, which emphasizes the need for sustainable agricultural practices that increase productivity and resilience in the face of climate change.

2. Additionally, the study's findings highlight the need for better infrastructure and market access to support cotton farmers. Addressing the logistical challenges of transporting cotton to distant ginneries and improving market linkages can help reduce costs, improve profitability, and enhance the competitiveness of smallholder cotton farmers. This resonates with **SDG 9: Industry, Innovation, and Infrastructure**, which calls for investments in infrastructure to foster sustainable industrial growth and innovation in rural areas.
3. To ensure the long-term sustainability of cotton farming in the region, policies that encourage crop diversification, improved climate resilience, and investment in farmer education are critical. By strengthening farmers' capacity to adapt to climate variability and market volatility, the sector can become more resilient and contribute to **SDG 12: Responsible Consumption and Production**, which advocates for sustainable agricultural production systems that reduce waste and promote efficiency.

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