

**FEASIBILITY
STUDY** ON
THE DEVELOPMENT OF
**COTTON
BY-PRODUCTS**
in Malawi

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List of acronyms and abbreviations

ADD	Agricultural Development Division
ADMARC	Agricultural Development and Marketing Corporation
AEDO	Agriculture Extension Development Officer
AICC	African Institute of Corporate Citizenship
CCM.....	Cotton Council of Malawi
CFM.....	Contract Farming Model
COFA	Cotton Farmers Association of Malawi
CORI.....	Cooking Oil Refining Industry
CPUM.....	Cotton Production Up-scaling Model
DARS	Department of Agriculture Research Services
DWS	David Whitehead and Sons
ECOAM	Edible Cooking Oil Association of Malawi
EIF.....	Enhanced Integrated Framework
EPA	Extension Planning Area
ESA	Eastern and Southern Africa
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FUM.....	Farmers Union of Malawi
GOT.....	Gin Out Turn
ICAC	International Cotton Advisory Committee
KII.....	Key Informant Interview
LUANAR.....	Lilongwe University of Agriculture and Natural Resources
MCDS.....	Malawi Cotton Development Strategy
MK.....	Malawi Kwacha
MoA.....	Ministry of Agriculture
MoTI	Ministry of Trade and Industry
MT.....	Metric Tons
NAIP	National Agriculture Investment Plan
NAP	National Agriculture Policy

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NCFS	National Contract Farming Strategy
NES	National Export Strategy
NGO	Non-Governmental Organization
PPP	Public-private partnerships
SADC	Southern African Development Community
SWOT	Strengths Weaknesses Opportunities Threats

Chapter 1. Introduction

1.1 Background

Malawi is a highly commodity-dependent country where commodities represented 92.3 per cent of merchandise exports in 2018-2019, increasing from 90.4 per cent ten years earlier (UNCTAD, 2021). Agriculture accounts for 31 per cent of GDP but employs 76 per cent of the workforce. Women represent more than half of the agricultural workforce. The agriculture sector, comprising estate and smallholder farming, accounts for almost 90 per cent of export revenue. The four leading commodity exports are tobacco, tea, sugar, and cotton. Malawi exports were down from about US\$1 billion a decade ago to US\$865 million in 2018-2019, reflecting the vulnerability of the economy to price fluctuations in primary commodities. As a landlocked country, Malawi depends on access to ports in neighbouring countries, such as the deep-sea port of Nacala in Mozambique, and other logistics corridors including railways, to reach international markets.

Historically, the very first cash crop of Malawi was coffee, followed by tea. However, since the 1920s, tobacco has been the country's main export crop. The ongoing anti-tobacco global campaign impressed the need for Malawi to identify alternative export crops such as cotton, which has been grown since the early 1960s. Over 200,000 smallholder farmers use their income from cotton to buy food and pay for other necessities. This is particularly crucial in cotton growing areas where food crops such as maize are constrained due to adverse weather conditions. Cotton has a relatively long value chain comprising, in addition to its production, the processing industry in terms of ginning, oil crushing, spinning and weaving companies, as well as textile and garment retailers. In total, 15,000 people are employed in the processing sector.

Until the 1980s, seed cotton was bought and processed by the government-owned Agricultural Development and Marketing Corporation. After market liberalization, private sector ginneries entered the cotton business (WTO, 2019).

The area that is dedicated for cotton production in Malawi is fully rainfed. More than half of this area is in the Lower Shire Valley. Although its planted area is much smaller than that used for main crops such as maize, groundnuts, sweet potatoes and dry beans, cotton is one of the priority oil seed crops. The National Agriculture Investment Plan (NAIP) describes cotton and other oil seeds as having potential both in the domestic and export market. Indeed, cotton seed oil consumption contributes to food and nutritional diversity.

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Despite the importance of cotton as a cash crop, its yields are generally low, hovering between 200 and 300 kg/Ha of lint in the past three decades (ICAC, 2021). This low yield is due to a number of constraints including the following: poor or inadequate insect and mite pest management, high investment requirements aggravated by high levies on inputs such as pesticides, spraying equipment, protective clothing and fertilizer; inappropriate crop husbandry practices; environmental factors such as moisture and heat stress in drought prone areas; low soil fertility; competition with high value crops with respect to pricing and marketing; and lack of high yielding varieties with improved fibre quality characteristics.

The Malawi Government, through the Ministry of Agriculture, launched a special programme for the revitalisation of the cotton value chain known as the Cotton Production Up-scaling Model (CPUM) between 2011-14. The government invested 1.6 billion Kwacha (equivalent to US\$10 million using an exchange rate of 160MK per US\$ in 2011) to support smallholder farmers within the framework of CPUM, leading to an average production of 148,000 metric tons of seed cotton for three seasons as of 2011/12. CPUM aimed to set up a cotton development fund sustained through levies from ginners and farmers. However, this failed because ginners under-declare the amount of cotton that they buy on the market to pay less levy. This happens because most cotton is traded through informal channels. So overall, there is limited transparency in the cotton market.

Following CPUM, the Contract Farming Model (CFM) was introduced between 2013 and 2015 by ginners who made an investment of K2 billion Malawi Kwacha (equivalent to US\$5 million using an average exchange rate of 400 MK per US\$ for the given period). It was expected that the private sector would sustain cotton production through CFM, which increased production of seed cotton by 7,000 metric tons on average during the implementation period. However, it was discontinued due to the high default rate of farmers, which resulted in losses amounting to 1.3 billion Malawi Kwacha (US\$3.25 million using 400MK per US\$). Since the peak recorded in the 2011/12 season, production volumes have been on the decline.

More recently, the National Agriculture Investment Plan (NAIP) for 2017/18-2022/23¹ has targeted strengthening the regulatory and institutional framework for cotton to create an enabling agribusiness environment and public-private dialogue. The priorities identified in the cotton value chain were lint and cotton seed oil crushing, which left out other cotton by-products. Since the ginning companies export more than 95 per cent of cotton lint and cotton seed (mainly to South Africa), they have a stable source of income. However, the income

¹ National Agricultural Investment Plan (NAIP). Prioritised and Coordinated Agricultural Transformation Plan for Malawi: FY 2017/18-2022/23. January 2018. https://www.scotland-malawipartnership.org/assets/resources/National_Agricultural_Investment_Plan_2018_Final_Signed.pdf

does not trickle down to the smallholder farmers who produce seed cotton, creating disincentives for increasing production.

1.2 Objectives and methodology

The objective of the report is to provide a feasibility assessment on the development of cotton by-products in Malawi. It highlights opportunities with regard to the use of cotton by-products in order to stimulate discussion among key stakeholders towards improving the livelihood of smallholder farmers. The feasibility assessment will provide the basis for requesting technical and financial support to develop cotton by-products as prioritized through a national validation process. It includes the analysis and mapping of stakeholders involved in cotton by-product value chains with growth potential, as well as the analysis of the policy environment, looking at the actual and potential bottlenecks, and the opportunities presented by cotton by-products with respect to their contribution to poverty reduction, inclusiveness, and gender equality.

The study relied on a hybrid approach that combined literature review, a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, stakeholder analysis, and participatory methods based on field data collection and data analysis. Field data was based on focus group discussions (FGDs), key informant interviews (KIIs), and a survey questionnaire which targeted smallholder farmers who produce cotton. All methods were gender-sensitive, taking into account the differences between men and women in the cotton value chain ecosystem.

Literature review

The literature review involved comprehensive enumeration, description, and summarisation of related research studies on cotton and cotton by-product development in Malawi. The data mining technique was employed to identify and extract relevant information about cotton by-products from large sets of data. Several databases were consulted as cited in this report, including the Food and Agriculture Organization Statistical Database (FAOSTAT). The review used technical reports prepared by stakeholders in the cotton sector and communications issued at international meetings, as well as several papers on cotton by-products that were submitted by the Enhanced Integrated Framework project officer.

SWOT analysis

A SWOT analysis was used to assess the cotton sector in Malawi. It helped to understand in detail and build on what went well, address what was lacking, minimize risks, and take the greatest possible advantage of the potential for success of cotton by-product development.

Stakeholder analysis

The study made use of stakeholder analysis and mapping, whereby it identified, categorized and visually represented key stakeholders involved in the development of specific by-products, as provided in Chapter 4. Each stakeholder analysis considers the interests, needs, impacts, risks and strategies that are valid for key players involved in the development of a specific by-product.

Participatory methods

Focus Group Discussions (FGD) involved gathering male, female, and youth smallholder farmers together in groups of 8 to 12 people to discuss cotton production, seed cotton marketing and cotton by-products. Research questions were asked about participants' perceptions, attitudes, beliefs, opinions, or ideas. The moderator (interviewer) was guided by a checklist for discussions on cotton production, seed cotton marketing, and cotton by-products.

The FGD process included sampling the respondents; recruiting a field team; developing a checklist; training and pre-testing; conducting FGDs; and transcribing, analysing and interpreting responses. A total of five FGDs were conducted covering Karonga, Blantyre, Chikwawa (Dolo and Mikalango Extension Planning Areas) and Neno. In total, there were sixty participants in FGDs (see Annex 1 for the participants list).

Key Informant Interviews (KIIs), also called the in-depth interviews method, were used to gather qualitative information. Like the FGDs, a checklist was used to guide the key informant interviews and capture the concerns and proposals of experts and officials relating to policy, cotton by-products, resources, and the performance of the cotton sector. Visits to warehouses were conducted to better understand the challenges encountered in cotton trade due to COVID-19. The data collection process included transcribing and coding; keeping clear folders and records; and the identification of respondents. In total, there were thirty-seven participants in KIIs (see Annex 2 for participants list).

A survey questionnaire was used to obtain basic information about the perceptions of smallholder cotton farmers. Different variables were measured including production, variety, market (seed cotton buyers and prices) and cotton by-products. A total of 142 farmer interviews were conducted using the survey questionnaire in selected districts of the northern region (Karonga), central region (Salima) and southern region (Chikwawa, Neno, Balaka).

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The remainder of this report is structured as follows: Chapter 2 undertakes an analysis of key players, institutions and the policy and legal environment for cotton production in Malawi. Chapter 3 provides an overview of cotton production, covering production trends, cotton extension support, challenges faced by smallholder producers, cotton markets, and cross-cutting issues. Chapter 4 presents a SWOT and stakeholder analysis with a view to identifying the potential for expansion of cotton by-products. Finally, Chapter 5 concludes with recommendations as suggested by actors in FGDs and KIIs in relation to legislation, policy, regulatory authority, private sector, cotton producers and cotton by-product value chains.

Chapter 2. Key players and policy environment

An enabling institutional policy environment is crucial for the development of cotton by-products. The below sections provide an analysis of the key institutions and players in the cotton sector of Malawi, as well as the current policy environment.

2.1 Key institutions involved in cotton production

For the purposes of providing government extension services, Malawi is divided into agro-ecological zones known as Agricultural Development Divisions (ADDs), which are further segmented into District Agriculture Development Offices (DADO) and Extension Planning Areas (EPAs). Non-governmental entities such as NGOs provide extension services following the same structure (Kundhlande et al., 2014).

The Ministry of Agriculture provides specialised cotton extension services through its Cotton Officers located in ADDs and DADOs, although extension services are needed more at the smallholder farmer level. There are Agriculture Extension Development Officers (AEDOs) closer to smallholder farmers, but they are not cotton subject-matter specialists that can competently advise on cotton production. There is a need to train and select AEDOs to work closely with District Cotton Officers on cotton production through cotton agronomy.

The Ministry of Agriculture leads cotton research through the Department of Agricultural Research Services (DARS) at Makoka Research Station in Zomba district. Quton, a company that supplies seeds in Malawi, is collaborating with DARS at Makoka and Chitala Research Stations to multiply the local cotton varieties. Chitala undertakes trials to observe the performance of cotton treated with Gaucho and Sivanto insecticide technology for integrated pest management. The trials screen cotton performance against early season cotton pest. Field information indicated that Gaucho technology has reduced the frequency required for using foliar sprays and the burden of resorting to intensive sprays by farmers at the development stage of cotton.²

The Department of Agricultural Research Services also works in collaboration with the Lilongwe University of Agriculture and Natural Resources (LUANAR), which undertakes Bt cotton³ (genetically modified) research. The broad cotton breeding programme at Makoka Research Station led by DARS aims to develop high yielding locally adapted varieties with

² Individual interview with Trial Assistant Godwin Cherwa at Chitala.

³ Bt is the abbreviation for the bacterium *Bacillus thuringiensis*.

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improved ginning out-turn (GOT) and acceptable lint characteristics, and pest tolerance. Current breeding activities are as follows:

- Selection from various materials like crosses between adapted Malawian varieties;
- Screening selected plants for yield and yield components like GOT, lint index, boll size, seed size; trials of progeny grown at three sites (Makoka, Ngabu and Chitala);
- Screening for jassid resistance⁴ under unsprayed conditions;
- Conducting district line yield trials before releasing the variety for commercial seed production.

Makoka Research Station has insufficient cotton scientists, inadequate infrastructure, and insufficient funding to support research and development on cotton breeding. The current breeding programme needs funding for on-farm trials and variety maintenance, seed processing and development of cotton by-products. Research on cotton by-products requires cotton seed oil millers and refiners, as well as equipment to add value to cotton stalk and linters.

The Cotton Council of Malawi (CCM) was established by the Cotton Act of 2013 with the mandate to regulate, develop and improve the cotton industry in Malawi. The CCM board of directors is composed of a Chairman who is appointed by the President, two members of ADMARC, two members of ginners, two members representing growers and two members representing the government. CCM has an oversight role on cotton production and marketing, seed cotton auction floors, ginning, monitoring sales, definition of seed cotton grades, and awarding licenses to buyers and exporters. The vision of CCM is to become a progressive regulator, effectively contributing to the development of a sustainable cotton industry. The mission of the Council is:

- To contribute to the growth of the cotton industry through the development of standards and regulations;
- To ensure adherence to fair trade practices by value chain players;
- To promote sustainable innovations and information sharing through a competent and committed workforce.

The Cotton Council of Malawi is still in its infancy. Its workforce is insufficient to effectively regulate the cotton sector. The Council has no institutions and structures to implement the Cotton Act of 2013. CCM has failed to sustain the ginners because of low production and

⁴ Jassid is a pest that affects the cotton crop. Screening involves identifying varieties that naturally show resistance to the pest, for example due to hairiness of their leaves.

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productivity of the cotton sector. When asked to supply lint to the international market, CCM fails to quantify the volume available in Malawi, because it does not have access to ginner databases, while ginner separately establish their own aggregation centres in proximity to the farmers.

However, despite limited staff, CCM is involved in input supply and cotton extension service delivery, which conflicts with its mandate as a regulatory authority. While the Malawi Cotton Development Strategy (MCDS) provides for the participation of private extension services delivery by farmers' organisations, ginner, input suppliers and NGOs to complement public extension services, the practice on the ground revealed that there was poor coordination among stakeholders. For example, in some ADDs where CCM conflicted with the established Agriculture Extension System, Cotton Officers have been deployed to other duties where staff were lacking. This has resulted in cotton becoming a part-time crop. In other cotton growing areas, the Cotton Officers at ADDs and District Cotton Officers had reduced the frequency of contact with smallholder farmers to a bare minimum.

The Key Informant Interviews revealed that CCM was implementing instead of regulating, which is a situation that is not favourable for boosting cotton production. Furthermore, the regulating authority has not set rules to operationalise the Cotton Act, which is already outdated in the current cotton ecosystem.

In the current setup, ginner collect cotton levies on behalf of CCM. This implies that the regulated become the regulator by default, hence it is difficult to enforce anything that would aggrive the relationship. The CCM board has some members with vested interests in the cotton sector that may likely manipulate the regulator. Seed suppliers, chemical suppliers, and buyers of seed cotton are all part of the board. The ginner, who is the buyer of seed cotton, also takes part in setting the Farm Gate price before the opening of the cotton market. This arrangement militates against fair trade. The powerful members of the CCM board with market intelligence are likely to take advantage of the market to determine (lower/higher) price offers.

2.2 Smallholder farmers

Cotton is mainly produced by smallholder farmers in Malawi, where labour productivity in the agricultural sector remains very low, with value added per worker of US\$170 per year. This figure is less than half the average productivity in low-income countries, which currently stands at more than US\$350 (Phiri, 2018). That in turn is significantly lower than SADC and SADC middle income country averages (US\$1088 and US\$1880, respectively). Much of the agricultural labour force in Malawi remains idle during the part of the season between

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marketing seed cotton and starting the next cotton planting season. There is a need to enhance labour productivity to meaningfully improve the livelihoods of rural people through input price policies, value addition to agricultural products and farm level output diversification. Off-farm value chain development, as through cotton by-products, has the potential to raise labour productivity, particularly in the period after the marketing of seed cotton, because it would provide employment opportunities in manufacturing, transportation, processing, and marketing.

Men constitute 72 per cent of the cotton farmers registered in the Cotton Farmers Association of Malawi (COFA) database. 26 per cent of these are youth, many of whom are engaged in supporting their parents in cotton production. Meanwhile, the findings of the feasibility study survey point to a more diverse picture on gender and employment in the cotton sector of Malawi. According to data obtained from survey respondents, cotton production was undertaken by men alone in 9 per cent of households; by women alone in 19 per cent; by a combination of men, women and youth in 33 per cent, and by men and other family members in 1 per cent.

Cotton is perceived as a domain for men because they lead the heavy task of field spraying. Women and youths play significant roles in cotton production as well, especially in labour-intensive tasks like weeding and cotton picking. Men largely assume control of output, make production and marketing decisions, as well as decisions on the use of revenue from cotton sales. This is mainly due to the traditional customs and beliefs, coupled with gender myths and stereotypes that are deeply rooted in Malawi. As a result, the effort of women put in cotton production remains limited. In addition, there is also low involvement of women and youth in the management of farmer organisations where very few hold decision-making positions that could be of influence.

Farmers organisations are at a very early stage in Malawi. From the interviews, a huge cotton business intelligence gap was identified between farmer associations and ginners, especially those who exported to international lint and cotton seed markets. Farmer organisations including COFA and cotton club leadership had limited data, information, and knowledge about the cotton business (cotton value chain) which weakened their hand in negotiating and mobilising resources. Access to finance by smallholder farmers is weak at present because the clubs only help farmers to access inputs (seed and chemicals) and not capital investment for value addition within the cotton value chain.

Cotton Farmers Association of Malawi (COFA)

COFA is a representative body of cotton farmers at national level that was formed in 2009. It functions as an umbrella organization of loosely organized cotton clubs. Although 65.5 per cent of smallholder farmers across the country are members of an association or cooperative at Extension Planning Area or district level, only 31.1 per cent of farmers are aware of COFA (Government of Malawi, 2019). It has no secretariat, and no funds to undertake initiatives towards increasing its membership. It has a Board of Directors that is elected every three years through voting by representatives of the 15 cotton growing districts of Malawi. COFA's main areas of work are improving access to production services, lobbying for marketing efficiencies, and representing members in policy fora.⁵ In its current form as an association, COFA is weak both financially and in terms of governance at national and district level.

Perception of smallholder farmers on cotton by-products

Most interviewed smallholder farmers (92 per cent) were aware of cotton by-products, but no respondent had ever earned extra cash from by-products. They were most familiar with cotton seed cake. At the household level, only firewood, cotton pillows and chair cushions were considered as important by-products of seed cotton. Firewood was used by 98 per cent of households for cooking. Cotton stalks were used as firewood or feed for cattle, which was against the closed season rule that promotes the 'uproot and burn on-site' practice. Other high value by-products mentioned during group discussions were feminine hygiene pads, baby hygiene products, pharmaceuticals, medical bandages, and soap. Medical bandages are not readily available in rural health facilities and patients are often asked to buy bandages from nearby pharmacies. Cottonseed oil could be used by small and medium-sized enterprises (SMEs) to produce soap. The Malawi Bureau of Standards undertook trainings for SMEs on making soap and could be part of a new initiative to produce cotton-based soap.

Smallholder farmers face the following challenges to their participation in the cotton by-product value chain:

- The policy environment is unfavourable for cotton by-products development, as it prohibits the use of cotton stalks off-farm (100 per cent of respondents);
- Limited knowledge of the by-products market to stimulate production (100 per cent);
- Lack of the capacity and skills to produce by-products (90 per cent);
- Lack of necessary equipment to produce by-products (10 per cent).

⁵ <http://mail.aiccafrica.org/index.php/news/110-cofa-elects-new-board-of-directors>

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The majority of smallholder farmers said that what they needed most was competitive seed cotton prices on the market to increase cotton production. Currently, ginners take ownership of the seed free of charge after the ginning process because the seed is not factored into the purchase price of seed cotton. Therefore, its value is concealed. Smallholder farmers recommended the introduction of a pricing mechanism for cotton seed and cotton stalks, clearly identifying them as by-products that can be sold. However, under the present scenario, smallholder farmers fear that ginners would not easily agree to cotton seed pricing. Market fairness was another concern of smallholder farmers, who see themselves losing out because of their weak organisation, and low financial and technical capacity. Ginners are more powerful in the cotton ecosystem as they provide input loans, regulate contracts, participate in seed cotton price setting, buy seed cotton, own linters and seed, and export cotton products. Producers require a stronger organisational setup, for example through Farmer Cooperatives, instead of just an association.

Cotton farmers' geographic location is a weakness and threat because they are separated from the main electricity grid, are too far from off-takers, and require business infrastructure and viable markets. Farmers already have difficulties to access production inputs, so investing in cotton by-products would become another challenge to resolve. Attracting investors, for example, in particle boards and briquette manufacturing, is perceived as a real challenge because they require large volumes of cotton seed and cotton stalks. Farmers hold the perception that investors may not be willing to get into stalk value addition at present cotton production trends. Hence, they suggest investing more in the cotton breeding programme of Malawi to improve productivity and cotton seed oil yield per kilogram to increase their income.

2.3 Ginners, oil seed crushers and textile manufacturers

There are three main ginners in Malawi: ADMARC, Afrisian, and Malawi Cotton Company Limited.

The Agricultural Development and Marketing Corporation (ADMARC) was formed in 1971 by Act Chapter 67.03 of Parliament as a Government-owned parastatal. The mandates of ADMARC include the promotion of the Malawian economy by increasing the volume and quality of its agricultural exports, and the development of new markets for the consumption of Malawian agricultural products. ADMARC is also mandated to procure and sell farm inputs such as fertilizers, seeds, and crop pesticides to support smallholder farmers. ADMARC has weak international cotton product market business intelligence, as demonstrated in some cases by not knowing where their lint was sold. ADMARC sold cotton products to brokers in

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South Africa, who in turn sold to lucrative global markets. The weakness of ADMARC was replicated at smallholder farmer level whereby farmers' seed cotton could not be sold to ADMARC, for example in Chikwawa and Karonga. ADMARC is politically vulnerable to operate as a business, leading to an unstable seed cotton market.

Afrisian Limited of Malawi is a subsidiary of Afrisian Ginning Ltd (AGL), which started business as a cotton ginner in 1997. Since then, AGL has expanded its trading activities both within the cotton sector and beyond. Today, AGL operations and products include oil seed crushing, rice milling, cleaning and export of peanuts, sesame seeds, maize and pulses such as green mung, yellow gram and pigeon peas. Afrisian Limited is the only ginner with head offices in Blantyre. In contrast to ADMARC, it has direct access to export markets and is in contact with the buyers of its lint and cotton seed. Afrisian Limited buys seed cotton from smallholder farmers, though at times late in the buying season.

Malawi Cotton Company Limited is a subsidiary of China-Africa Cotton Development Limited and is located in Salima. Apart from Malawi, it carries out business in Mozambique, Zambia, and Zimbabwe. In addition to seed cotton buying, the Company is involved in cotton seed breeding, distribution, planting, processing, marketing, oil processing and sales, cotton by-products sales, as well as spinning and sales of low-grade cotton. Malawi Cotton Company Limited shut down in 2022 because of the lack of raw materials to operate its ginnery.

The Edible Cooking Oil Association of Malawi (ECOAM) is the apex organisation of the oil seed crushing and seed subsectors. There are five key players in the edible oil industry: Capital Oil Refining Industries (CORI) Limited; Sunseed Limited; Meru; Agri Value; and Moti Oil Mills Limited.

Three companies are involved in the manufacturing of textiles (fabrics), namely; Mapeto-David Whitehead and Sons Malawi Limited (MDWS), Knitwear Industries Limited, and Malawi Cotton Company Limited. The Malawi Council for the Handicapped (MACOHA) has a weaving factory at Bangwe in Blantyre. All these companies have scaled down their operations due to inadequate raw materials and other inputs, as well as unfavourable competition from smuggled products.

Perception of processors on cotton by-products

Knowledge of cotton by-products was common among processors (ginner, oil seed crushers and textile manufacturers) that were consulted during the study. Cotton by-product initiatives are part of the business growth strategies of processors. Ginner is a powerful player in the cotton sector because they buy seed cotton from smallholder farmers. They trade in cotton seed, crush seed into edible oils and produce cotton cake for livestock feed.

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Ginners are already engaged in cotton seed marketing in the domestic and export markets. Afrisian Limited exported cotton seed to South Africa, specifically to Johannesburg and Stellenbosch. However, cotton seed prices varied on the international market depending on demand and supply dynamics. Afrisian Limited described the domestic market for cotton seed as small and not stable. There was no large domestic buyer of cotton seed in 2020, 2021 and 2022.

Ginners like ADMARC indicated that among bankable projects, they planned investments in crushing cotton seed into oil, producing animal cake, and manufacturing of pharmaceutical products such as cotton wool, bandages, feminine hygiene products, and baby products. Mapeto (DWS) Limited Company was exploring investing in linters by-products, specifically pharmaceuticals manufacturing, feminine hygiene and baby nappies. Mapeto Limited already manufactures ropes from cotton linters that are sold on the domestic market. The Edible Cooking Oil Association of Malawi has state-of-the-art technology and infrastructure with huge capacity for manufacturing edible oil but cited low quantities of cotton seed and low oil yield per kilogram of cotton seed as key issues.

The risk faced by the edible oil sector is the importation of crude vegetable oil which leaves the local cotton seed unused. Cooking oil manufacturers import crude vegetable oil as an intermediate product, thereby avoiding taxes, and refine them for the local market, blaming the tax regime that renders the production of local cooking oil expensive. Furthermore, local oil manufacturers choose to import sunflower seed due to the low oil yields of local cotton seed. As a result, ginners find it to be their best option to export their available cotton seed to South Africa, where seed is bought in United States Dollars, and fetches better prices compared to the domestic market, where Malawi Kwacha is devalued against the dollar every year before agricultural commodities markets open.

2.4 Policy environment

The Malawi Growth and Development Strategy III, National Agriculture Policy, National Agriculture Investment Plan (NAIP), and National Export Strategy (NES) have identified cotton as a priority cash crop for employment generation and poverty reduction. Several policies of Malawi have identified cotton as a key economic sub-sector, with the potential to benefit 1.6 million people in the drier lakeshore areas and Shire Valley. The NAIP ranks cotton as one of the top five effective value chains to stimulate economic growth.

The Government of Malawi, through the Cotton Act of 2013, regulates cotton production, processing, marketing, and matters incidental thereto. The Cotton Act promotes crop hygiene in the field through the observation of a closed season. It requires that farmers uproot

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cotton stalks by 30 July and burn them by 15 August in the Central and Southern Regions. In the Northern region, the Cotton Act compels smallholder farmers to uproot stalks by 31 August and burn them by 15 September. Any person who fails to comply with this regulation commits an offence. Consequently, the regulation limits the scope of use of cotton stalks as a by-product in Malawi, and it can only be reviewed and amended through a Bill of Parliament.

Currently, there are no dedicated policies on cotton by-products in Malawi. However, there is limited mention of by-products in some policies, in particular regarding edible oil and cotton seed cake. The potential of oil seeds has already been identified under the NES and has been confirmed by the Economic Computable General Equilibrium Model, which demonstrated that the economy of Malawi would undergo positive change if cotton seed oil were to be developed and exported (Government of Malawi, 2012).

Cotton seed oil was recognised as a by-product with export potential by the following policies: Malawi Cotton Development Strategy (MCDS) 2019-2024, National Agriculture Policy (2016), National Export Strategy (2012), National Agriculture Investment Plan (2018), and National Contract Farming Strategy (2016). These policies are focused on addressing the challenges relating to value addition, export trade and regulatory frameworks. For example, the NAIP and MCDS have developed strategies to strengthen the policy and regulatory environment, and to enhance trade competitiveness and market development. These policies are not adequately propelling real transformation at smallholder farmer (micro) level, as farmers demand fair prices that can increase their income. The current state of policies persistently holds smallholder farmers at the production segment of the cotton value chain to supply the needed raw materials to the industries through established ginners' markets of seed cotton. The National Contract Farming Strategy (2016) links farmers, ginners, suppliers of farm inputs and third-party entities participating in production arrangements. The ginners provide inputs (seed and chemicals) to smallholder farmers that are organised in cotton clubs. Contract farming has failed to deliver results due to weak market arrangements to recover input loans given to smallholder cotton farmers.

There are policies that focus on increasing cotton production in Malawi. The MCDS, for example, aims to increase production from the current level of approximately 20,000 MT to 200,000 MT, and yields from 750 kg/ha to 2,000 kg/ha by 2024 through investment in market development, research, technology generation, and dissemination of information on good farming techniques. The 200,000 MT target is higher than the original 100,000 MT target set by CCM. The MCDS takes as a reference the highest production level ever attained, in 2011/12 season (176,534 MT), while the CCM target is based on the average cotton

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production for the decade between 2011 to 2020 of 73,000 MT. Given that production has been on the decline for a decade and little has been done to improve the situation, the MCDS target remains unrealistic. Likewise, the MCDS target yield of 2000 kg/ha is also ambitious considering the current level of investment in research and development. Since the inception of MCDS in 2019/20 season, there has been limited investment in cotton research, and insufficient extension services delivery in order to raise production.

Nevertheless, the MCDS plans to strengthen small scale value addition to seed cotton, using existing mini-ginneries that are supported by the One Village One Product (OVOP) Programme, and plans to achieve its target production level through three strategies:

- Recruiting more smallholder farmers;
- Investing in irrigation infrastructure;
- Recruiting larger agricultural organisations such as Press Agriculture Limited.

The Malawi Bureau of Standards (MBS) is a statutory organization established in 1972 by an Act of Parliament (Cap 51:02) of the Laws of Malawi (Amended as Act No 14 of 2012) mandated to enforce standardization of and quality assurance of products and commodities. Therefore, MBS is an important player in the development of cotton by-products for medical uses, human food, and animal consumption. Although SMEs account for a large share of employment in Malawi, they have limited skills and knowledge to participate in the manufacturing sector and trade in the formal markets because of the skill and knowledge gaps of MBS.

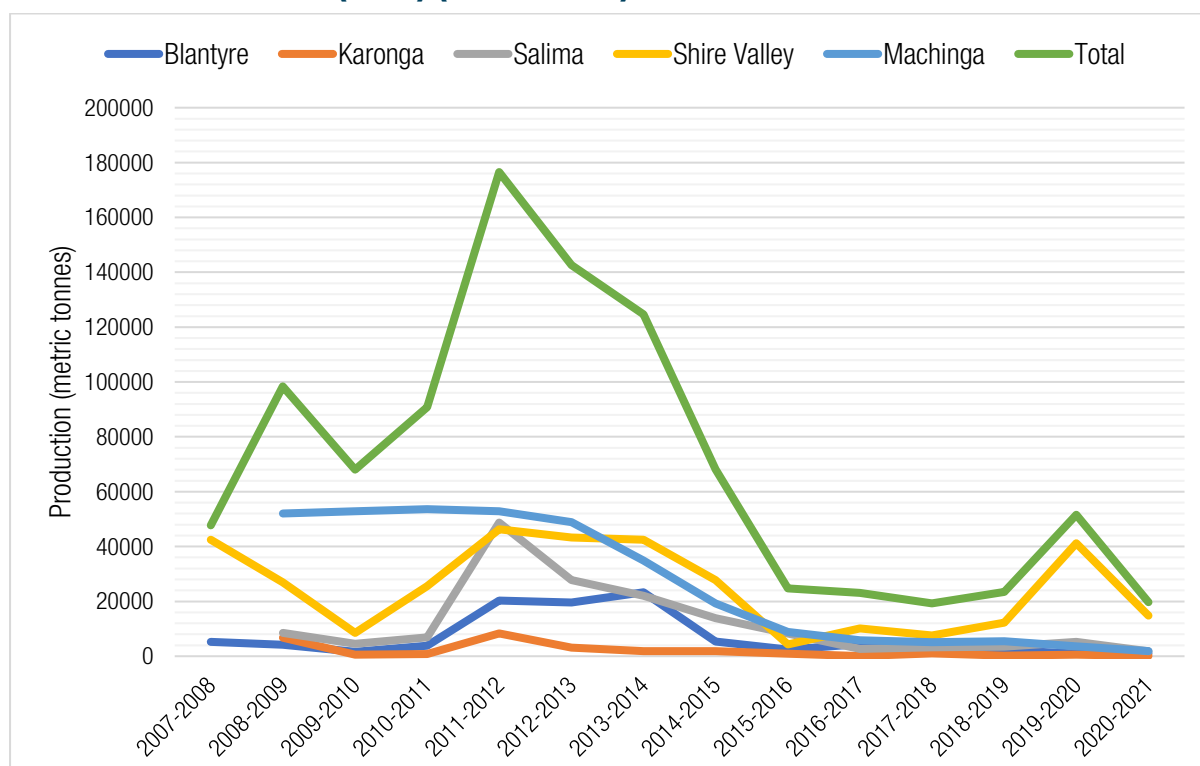
It remains to be seen whether these strategies will succeed in an environment where large ginneries and cotton seed crushers have exited the business because of low cotton production. Furthermore, the MCDS has not adequately outlined strategies on seed cotton pricing arrangements, which is one of the major challenges faced by smallholder farmers. During focus group discussions and KIIs, it became clear that without increasing seed cotton volumes, the development of by-products would be a far-fetched dream for Malawi.

Chapter 3. Overview of cotton production in Malawi

3.1 Seed cotton production trends

Cotton is traditionally produced in five of the eight Agricultural Development Divisions (ADDs) in Malawi, where it provides a valuable source of revenue: drought-prone areas of Karonga, Salima, Blantyre, Machinga, and Chikwawa and Nsanje districts of Shire Valley. According to the Cotton Council of Malawi, the country has the potential to produce more than a hundred thousand metric tonnes of seed cotton annually if farmers were mobilised, input supply systems were effective, and seed cotton prices were attractive to smallholder producers. However, since 2015, annual seed cotton production has mostly been around only 20,000 MT, and planted area has been gradually receding down to a low of about 17,000 hectares in 2020-2021 season. Figure 1 shows cotton production trends as reported by five ADDs between 2007 and 2021.

Figure 1: Malawi cotton production trends by Agricultural Development Division (ADD) (2008-2021)



All ADDs experienced relatively high levels of cotton production between 2011-2014 due to the Cotton Production Up-scaling Model (CPUM). Production at national level peaked in 2011/12 growing season mainly due to CPUM, whereby farmers were mobilised to produce cotton. Following the end of CPUM, the cotton industry has experienced a downward trend.

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The sudden drop in cotton production and low seed cotton production between 2013-2021 across ADDs was due to three main factors:

- Low seed cotton prices in years of high production and subsequent years which forced farmers to exit cotton farming;
- Timing of supply of cotton seed for planting was not well synchronised with farmer's availability of cash (late supply of seed on the market);
- Use of recycled seed by some farmers which affected cotton productivity (and consequently production).

Other issues were responsible for the drop in production as well, ranging from poor supply of inputs, low access to extension services, low adoption of good cotton production practices, and negative climate variability impacts.

Very low production levels were recorded as of the 2015/2016 season especially due to drought and mealybug experienced in Shire Valley ADD, where planted area was lowest in 2016/2017 (12,531 ha) because of poor seed cotton prices recorded in the previous season. Other factors also played a role in low production, as in the case of Karonga ADD, which is close to the border with the United Republic of Tanzania. Cotton production never really recovered in Karonga after the end of CPUM. During a field visit, smallholder farmers in Karonga mentioned that they chose to grow sesame and groundnuts over cotton because they fetch better prices in the Tanzanian market. Sesame and groundnuts are exported to Tanzanian vendors who then sell the produce to cooking oil crushers in the United Republic of Tanzania.

More recently, the sudden increase in cotton production that can be observed in Figure 1 in Shire Valley for 2019-20 was due to two factors: 1) farmers planted hybrid seed which increased cotton productivity per hectare, and 2) farmers benefited from soft loans in the form of seed through CCM, whereby they paid 50 per cent of the cost of seed, while the Government injected funds to support CCM for the remaining 50 per cent. The sudden decrease thereafter was due to the discontinuation of the soft loans and poor seed cotton prices.

3.2 Cotton yields

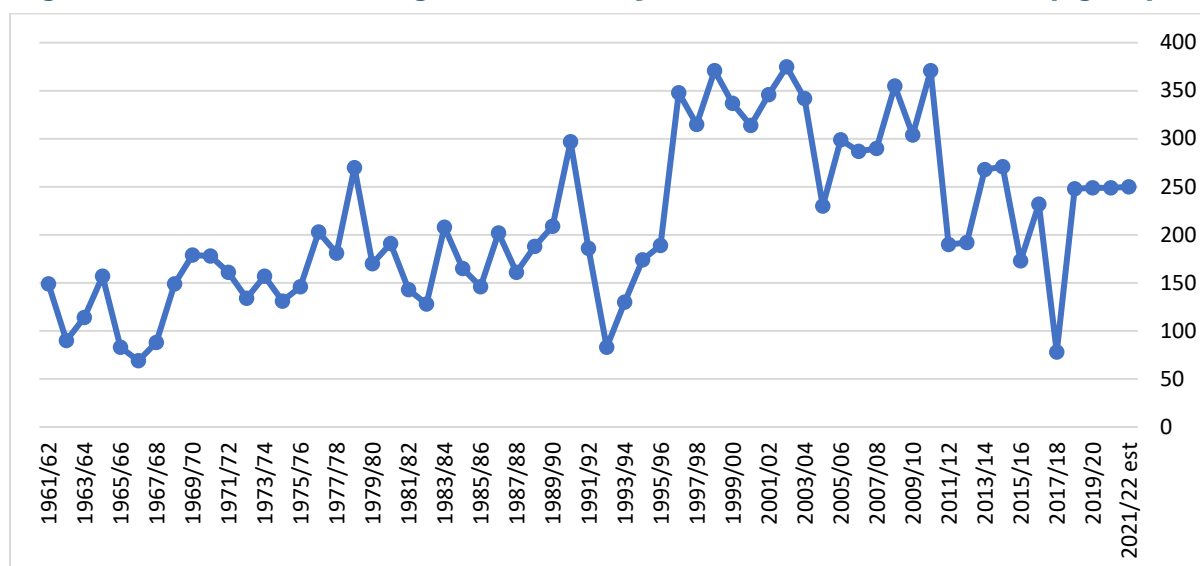
Cotton is treated as a special crop in the Cotton Act of 1953. The Department of Crop Development is allocated funds to facilitate cotton agronomic extension services, but presently this funding is not channelled to the department. Limited investment in the cotton sector has affected research and development and the delivery of extension services.

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Research in the cotton sector is underdeveloped, as can be observed from the cotton variety release history of Malawi where only one variety has been released in the last two decades (the Makoka 2000 seed). The local cotton seed planted by farmers had poor germination which resulted in wastage of seed, low yields, and weak plant stands susceptible to diseases and pests. These conventional cotton varieties require smallholder farmers to spray against bollworm infestation seven to eight times to control the pest. Resource-poor farmers lament this situation because sprays are costly and labour-demanding, making the growing of cotton less profitable, hazardous to human health and environmentally unfriendly.

Seed cotton lint yields in Malawi averaged around 300kg/hectare compared to the global average of 700kg/hectare, and as high as 2000kg/hectare for some advanced economies (WTO, 2019). Figure 2 shows the average lint yield in Malawi as of 1961/1962 season.

Figure 2: Malawi average cotton lint yields from 1961 to 2021 (kg/ha)



Source: ICAC

From the mid-1990s onwards, yields fluctuated between 300 and 350 kg/ha because cotton benefited from dedicated Cotton Officers who provided extension services on agronomic practices as well as good access to inputs and their adequate use in the cotton field. It was in the mid-1990s to early 2000s that Malawi liberalized its market of special crops including cotton, resulting in private sector investments. In 2004/2005, yields dropped because ADMARC ginneries were privatized, which affected timely cotton seed and chemicals supply in the designated outlets that had new owners. The decline in productivity recorded in 2017/18 was due to late seed supply and poor prices. Yields increased again thereafter because of the hybrid cotton seed offered by CCM on discount.

The average lint yield for the last four seasons remained around 250 kg/ha. Although genetically modified pest-resistant Bt cotton may boost yields four-fold over conventional

varieties,⁶ it may not improve yields under 100 per cent rain-fed agriculture. Bt cotton is more suitable for irrigation-based production,⁷ which is currently underdeveloped in Malawi. There are variations between Agricultural Development Districts (ADD) in terms of cotton yields because of the different numbers of farmers who grow cotton, varieties grown, and market competition. For instance, Shire Valley, Machinga ADD, and Blantyre ADD have larger numbers of cotton farmers than Salima and Karonga ADDs. At present, Shire Valley produces 50 per cent of national seed cotton.

3.3 Extension services

The Malawi Cotton Development Strategy (MCDS) has provided for multi-stakeholder involvement in cotton extension service provision to ensure that more smallholder farmers are reached. The MCDS states that the Ministry of Agriculture provided 49.5 per cent of all extension services, followed by lead farmers (9.7 per cent). Ginners, NGOs and others accounted for only 2.8 per cent of extension services. Only registered farmers with COFA (29,118 farmers) can receive extension support with the objective of increasing cotton production, in addition to production inputs. COFA thereby aims to encourage unregistered smallholder farmers to join the Association.

The results of the feasibility study survey revealed that respondents received farmer-level agronomic advice from an AEDO with varying frequencies: yearly (27 per cent), semi-annual (12 per cent), quarterly (7 per cent), monthly (15 per cent), weekly (9 per cent), received no advice (31 per cent). Surveyed smallholder cotton farmers were also asked about the challenges they faced in cotton production. Low seed cotton prices were mentioned as the longest standing challenge faced by 87 per cent of smallholder farmers surveyed. Cotton prices were described as unstable from year to year and the price-setting mechanism as not participative, since farmers participated only cosmetically in the process through COFA. Forty-six per cent of respondents mentioned other constraints, which included: late payment by ginners, prohibitive COFA registration fee, aging labour, transportation of seed cotton to market, and poor extension services. Other pressing challenges were lack of seed cotton market (mainly in Karonga); scarcity of cotton seed during planting time; disease and pest prevalence for some cotton varieties; labour constraints to support spraying activities; land for cotton production; and regulations governing seed cotton markets (Table 1).

⁶Alliance for Science. <https://allianceforscience.cornell.edu/blog/2019/07/kenya-field-trial-shows-bt-cotton-boosts-yields-four-fold/>. Accessed: 22/08/2021

⁷ Kai Hughes. Recent Developments in the Cotton Market & Advanced Cotton Technologies for Africa. https://www.wto.org/english/tratop_e/agric_e/03_icac_global_cotton_market_and_new_technologies.pdf

Table 1: Challenges faced in cotton production reported by survey respondents

Challenge	Proportion (per cent)
Low market prices	87
Other constraints	46
Lack of markets	45
Lack of planting materials	41
High pest and disease infestation	28
Labour is demanding	5
Lack of land	2
Harsh government regulations	1

Source: Survey of cotton farmers.

3.4 Analysis of seed cotton market

The study examined cotton markets at two levels: 1) smallholder farmers and 2) ginners (export market). The smallholder farmers market was zoned until August 2021 according to Extension Planning Area (EPA) boundaries. This gave the ginners control of the following:

- Specifying the quantity of seed cotton for production;
- Registering farmers through clubs⁸ willing to grow cotton;
- Signing production contracts with farmers;
- Supporting registered farmers with production inputs and extension services; and
- Buying seed cotton from allocated zones only.

The zoning system was established to structure the cotton market to enable ginners to recover loans and reduce loan default rates. Smallholder farmers felt that zoning the seed cotton market was deliberately arranged to protect the ginners' business interests and not theirs. For example, if a ginner had no financial capacity to buy all the seed cotton from smallholder farmers, those farmers stood to lose, as they could not sell in other zones. Also, if the ginner did not have enough money to invest in a cotton production campaign, input supply and extension service delivery, farmers stood to lose in that zone. However, on 9 August 2021, COFA and ginners in Central and Southern Malawi resolved to abolish the zone system of selling seed cotton in the 2021/22 growing season, to create room for competition

⁸ These clubs were intended to be channels through which credit facilities and agricultural advice would be made available to larger numbers of farmers than hitherto. The Government of Malawi, through its Ministry of Agriculture, introduced farmer clubs in 1978 into the smallholder agricultural system (Kishindo, 2008).

among ginners.⁹ The contract system of seed cotton marketing was adopted for the 2021/22 growing season.

The cotton marketing season in Malawi runs from May to August. In the case of Salima district, farmers indicated that they had to travel long distances to sell cotton in another zone because ADMARC, which was the ginner assigned to their zone, had run out of funds to purchase their stocks. Further, in 2020, the market period was affected by COVID-19. The global cotton market was disrupted, which affected the local market as some ginners could not export lint. For example, at Ngara ADMARC ginnery in Karonga district, a large quantity of ginned and unginned cotton remained in the warehouse (Figure 3).

Figure 3: Ngara ADMARC Ginnery in Karonga



Source: Field visit to a cotton warehouse in Ngara ADMARC ginnery in Karonga district (photo by Grecium Kachali)

The main export markets for cotton from Malawi are the United Arab Emirates, South Africa, Hong Kong (China), Mozambique, Bangladesh, India and Switzerland.¹⁰ The African Growth Opportunity Act (AGOA) provides duty-free access to the United States market for certain products from Malawi including cotton products such as textile. AGOA stimulated trade in the late 1990s and early 2000s, during which cotton and lint production, and the resulting textile manufacturing destined for export was relatively high.¹¹ This effect dissipated once cotton production plummeted. It was also confirmed through gravity models that the size of

⁹ <https://times.mw/zone-system-in-cotton-abolished/>

¹⁰ <https://www.selinawamucii.com/insights/market/malawi/cotton/>

¹¹ Based on the findings in UNCTAD (2003), and Condon and Stern (2010).

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trade partners, costs associated with distance to trading partners and exchange rates significantly affected the margins of Malawi's cotton exports.

In Malawi, the demand for seed cotton by far exceeds the available supply in the market. Malawi has a total ginning capacity of 450,000 MT. ADMARC alone has three ginneries¹² with a total of 150,000 MT ginning capacity. However, in 2021, three ginners were active with total ginning capacity of not more than 210,000 MT (Table 2). At the time of the feasibility study, ginners had bought only 9,408 MT of seed cotton out of the estimated 20,000 MT available in 2021 (Table 2). Even if all the available seed cotton were sold, it would leave more than 90 per cent idle ginning capacity. The survey identified that ADMARC, Afrisian Limited and Malawi Cotton Company were the main ginners that bought seed cotton from farmers. Malawi Cotton Company shut down in 2022, implying that it would not buy seed cotton anymore. The ginning capacity by far exceeds seed cotton production and demonstrates the need for raising production volumes.

Table 2: Active ginner capacity and seed cotton bought as of July 2021

Ginner	Ginning Capacity in MT	MT bought by July 2021
ADMARC	150,000	2,800
Afrisian Limited Company	30,000	5,576
Malawi Cotton Company Limited	30,000	1,031
Total	210,000	9,408

3.5 Seed cotton minimum price formula

Seed cotton prices are determined by cotton sector stakeholders composed of ginners, COFA, Ministry of Agriculture, and the African Institute of Corporate Citizenship (AICC) on behalf of NGOs. Prices are set at a CCM committee where stakeholders are invited. The CCM board ratifies the price, which is then endorsed by the Minister of Agriculture.

The seed cotton minimum price is based on three main variable costs: 1-inputs, 2-labour, equipment & other costs, and 3-capital investments. A break-even price is computed, then multiplied by a 30 per cent profit margin to come up with the farm gate price which includes a K20 levy for CCM.

For example, the 2021 farm gate price of seed cotton originally presented by COFA was K399.14 per kg and the corresponding break-even price was K307 per kg. However, before the start of buying of seed cotton in 2021, the farm gate price was reduced to K360, to reflect

¹² Ginning capacity of 50,000 MT each.

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changes in international market prices. Hence a farmer would make a profit of only K33 per kg from the approved farm gate price (K360 minus K20 CCM levy, minus break-even price of K307), down from K92.14¹³ per kg if the original proposal had been approved by price-setting stakeholders. Simply put, the farmer makes no more than K33,000 (around US\$40) profit per tonne of seed cotton. As a result, the farm gate price for seed cotton acts as a disincentive to cotton production. On 13 April 2022, the Minister of Agriculture announced the minimum farm gate prices for agricultural produce for 2022, which included the K400 minimum farm gate price of seed cotton against K446 proposed by COFA. The minimum farm gate prices were not significantly different from 2021 but remain low compared to the cost of living.

Smallholder farmers do not have direct input in setting the price. One key informant commented as follows: “In my view, the cotton and cotton by-products market are highly controlled by the buyers who in turn blame the international market for fixing the seed cotton prices, thereby putting farmers on the receiving end of poor prices. The cotton and cotton by-products market are tilted towards the ginners and cotton by-product companies. Farmers get a raw deal in most cases. Prices are determined by the buyers when farmers have already invested in cotton production and prices are usually below break-even ranges.”

There is indeed a temporal discrepancy between the process used to set the seed cotton price and the situation on the ground. For example, the cost of inputs (such as fertilizer, labour, chemicals) may be US\$20 at the start of the growing season in October. The farmer plants a hectare of crop in November/December and manages the crop in the field. In the following March/April, farm gate prices of various crops are set before the produce markets open in May/June. At this time, gross margin is calculated based on input costs at the start of cropping season, even though during the production cycle, the price of inputs goes up to US\$30 due to inflation. Therefore, the gross margin diminishes, and the farmer may be unable to reinvest in a hectare of land next October.

Trends for export market prices for Malawi cotton have been decreasing since 2011. Literature shows that high return markets in 2019 for Malawi cotton per kilogram were Mauritius, Zimbabwe, United States of America, China and Mozambique. Selina Wamucii¹⁴ illustrates that export market prices of Malawi cotton have been fluctuating recently. A kilogram of cotton was going at US\$1.25 in 2017 and US\$1.54 in 2018. In 2019, the export price went down to US\$1.39 per kilogram. In 2021, the approximate price range for Malawi cotton was between US\$1.39 and US\$1.54 per kilogram.

¹³ Profit: K399.14 - K307= K92.14

¹⁴ <https://www.selinawamucii.com/insights/prices/malawi/cotton/>

3.6 Overview of cotton sector financing and role of financial institutions

The development of cotton by-products depends on leveraging existing means of cotton sector financing. Hence, the study looked into financing and financial institutions, and found that they are not actively involved in the cotton industry at smallholder farmer level. While ginners were able to get loans for capital investment from financial institutions due to their capacity and access to property as collateral, farmers do not have the possibility to obtain such loans. CCM provides guidelines on how smallholder farmers could access loans in the form of inputs (seeds and chemicals) through contract farming. Farmers access input loans from the ginners, which in turn get deducted from seed cotton sales.

The main reason why financial institutions are not very much involved in the cotton sector is the unstructured cotton market. Ginners and vendors buy directly from smallholder farmers because cotton does not get to the market through one gate. Ginners act as financial institutions that provide loans in the form of inputs and recover the loans during the seed cotton marketing season, which puts them in a position of power over smallholder farmers especially in terms of price-setting. When vendors resell their seed cotton to ginners, it becomes difficult for ginners to recover loans granted to smallholder farmers who had originally sold their seed cotton to vendors. Hence, commercial banks are unwilling to invest in such a risky business with high default rates. ADMARC and Afrisian Limited recently experienced huge default rates. In 2020, Afrisian Limited reported a loss of K16 million (US\$19,762.50) on which farmers defaulted because much cotton was sold to vendors who in turn sold to Afrisian Limited. In 2021, Afrisian Limited disbursed K180 million (US\$222,328.09) as loans (farm inputs) to smallholder farmers in designated zones of operation and had not yet completed loan recovery by early July. If the market were structured like tobacco, ginners would have recovered their loans through commercial banks. For example, Standard Bank of Malawi indicated to CCM that it is ready to offer cotton production loans only if the seed cotton market is structured like the tobacco auction floors.

In the tobacco sector, large commercial companies produce and manage contracts with smallholder farmers who all sell their tobacco on four auction floors provided by the Auction Holdings Limited (AHL), which is formed by a group of companies that trade in agricultural inputs, purchase, and re-handle tobacco on auction floors. After sales, AHL settles payments to growers through given bank accounts. The Tobacco Export Association (TEAM) of Malawi is the grouping of buyers of tobacco at the auction floors. TEAM also buys tobacco on the action floors on contract arrangement from growers (smallholder farmers and commercial producers) at agreed prices for defined grades of tobacco. All the proceeds from tobacco

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sales to the smallholder farmers are paid through commercial banks, which makes it easy to recover loans. This is not the case in the cotton sector where there are fewer large producing companies. The National Agriculture Investment Plan for 2017/18-2022/23 has prioritised the development of the cotton market to the standard of tobacco where all buyers come to the auction floor.

Issues related to the structure of the cotton market that impede financing are compounded by the lack of financial technologies. Digital financial tools have not yet penetrated the Malawi cotton industry. Use of mobile money or electronic payment is limited in the cotton sector because of the cost of transactions. Most cotton producing areas are located far away from banks and other mobile banking services. Farmers said that use of electronic payment was not in their best choice because the commission paid per transaction was high. They cited the following example: assuming a farmer has sold seed cotton of K100,000 (US\$123.52) electronically, the farmer is faced with two options, to travel to the bank or nearest mobile money agent. Travelling to and from the bank, the farmer spent K5000 (US\$6.18). If he decided to cash K100,000 through a mobile bank agent or mobile money agent, the farmer would pay a commission of K3250 (US\$4.01) to the agent, which is an additional loss of income. Even if money were cashed at a mobile money agent, the farmer would still have to travel to a town or urban area to buy essentials, which would raise the cost of the mobile money transaction.

3.7 COVID-19 and cotton production

The COVID-19 pandemic has negatively impacted the economic growth and livelihood of Malawi. According to the rules of the Public Health Act, cotton production is essential, but COVID-19 guidelines and restrictions on movement curtailed the regular services provided by cotton extension workers to smallholder farmers. Due to restrictions on nonessential travel and movement and the lack of prior preparation, farmers found it hard to monitor fields, access input supplies such as fertilisers, disease and pest control inputs, and improved seeds, all of which are crucial to secure or maintain agricultural productivity. COVID-19 also heavily disrupted trade in agricultural inputs and products. Since the economy of Malawi largely depends on agricultural exports, the disruption in world markets in 2020 led to significant decreases in returns.

Workplace guidelines included complying with physical distancing rules, reduced seating capacity in vehicles by 50 per cent and restriction in face-to-face meetings. Due to COVID-19 restrictions on gathering, the opening of the seed cotton market was delayed by a month and opened only in June 2020. To cope with COVID-19 restrictions, the Ministry of Agriculture

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and other stakeholders promoted access to agriculture advisories using radios, print media, video, mobile vans, and social media (e.g., WhatsApp). However, the use of electronic media brought in new gender-related inequalities as men have more control over WhatsApp phones than women at the household level, where more men own the telephones.

The replacement of face-to-face meetings by online meetings brought its own challenges as Government staff struggled with connectivity and access to the resources to buy data bundles for subscription to internet providers. Internet was required to enable them to work at home and participate in online meetings. Connectivity issues were gradually resolved as everyone had to adjust to the 'new normal'. Despite that, online meetings privileged the wealthy, while neglecting farmers in rural Malawi and exacerbating inequalities due to the digital divide. Most smallholder farmers are not connected to the Internet and other information and communication technologies that support online meetings. Besides, farmers live far away from the power grid and good internet infrastructure.

Food supply chains functioned well in the first half of 2020, but later got affected after lockdowns in South Africa, Zambia and Zimbabwe. Malawi imports most of her processed foods. Therefore, lockdowns have affected the food supply chain. Some stocks were not available on counters because of food import disruptions. Imported food prices for edible oils, for example, have gone up by 62 per cent. Prices for fertilisers have gone up by 70 per cent, which is likely to affect crop production in the 2021/22 season.

As a result of the reduction in seating capacity in public transport by 50 per cent, fares of minibuses and other public transport has doubled. Passengers are asked to pay US\$1.6 for routes that previously cost MWK600 (US\$0.8). In turn, the price of commodities on the market went up because of the rise in transport costs. The current tendency is that after selling seed cotton, farmers travel to the nearest town or urban area to save on transport costs and buy clothing, agricultural inputs, groceries, food supplies, and access banking services. However, the increase in transport costs affected the movement of farmers to such a degree that they meet fewer of their basic needs than they did before the COVID-19 pandemic.

Chapter 4. The cotton by-products landscape in Malawi

This Chapter analyses cotton by-products that the study has identified as those with the highest potential in Malawi, as informed by policy prioritisation, private sector business strategies, farmers’ perceptions, and the SWOT analysis presented in Table 3. These are cotton seed oil (edible oils), cotton cake, linters, and cotton stalk, some of which are currently being produced to a limited extent, or have already been produced but now been discontinued due to impediments such as insufficient volume of seed cotton. The chapter presents under each by-product a stakeholder analysis.

Table 3: SWOT analysis of the Malawi cotton sector to assess the potential of by-products

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Legal and policy framework that governs the cotton value chain - Established regulatory authority (CCM) - Edible oil manufacturing companies crush cotton seed and make cotton oil cake - By-product production as poultry and livestock feed from soybean and sunflower - Seed oil millers have 500,000 MT capacity and 250,000 MT refining capacity per annum - Demand for seed oil is high - Ginners are available - Bioenergy demand for cooking and industry is growing - Sufficient land available for cotton production - Well-organized farmers (COFA) 	<ul style="list-style-type: none"> - CCM board composition has powerful members with vested interest in the cotton sector - CCM is in the infancy stage - CCM is carrying out roles outside its mandated area - Weak extension service delivery - Challenges linked to seed research and seed oil development - Market arrangements and pricing - Farmer organisation still at infancy - Difficult to access financing by smallholder farmers - Corruption and fraud in cotton sector - Low cotton production and productivity - Cotton seed is expensive on the local market - Low oil yield per kg of crushed cotton seed - Unfavourable tax regime compared to SADC and COMESA edible oil market - Undeveloped markets for by-products e.g. livestock - Policy & legal framework gap on by-products - Lack of set standards governing production of by-products, except for seed oil. This also starts at the production level: the commodity determines the value of the product. - General lack of knowledge on cotton-by products - Lack of mechanization for production

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STRENGTHS	WEAKNESSES
	<ul style="list-style-type: none"> - Lack of incentives (tax and non-tax) for the sector - Lack of extension backup services. Farmers are unaware of best production practices/technologies, leading to high production costs
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> - Cotton is prioritised by several policies as an important economic sector - Potential to produce over 100,000 MT of seed cotton - Market of cooking oil and crude oil is available locally and on export market - Demand for animal feed is high in South Africa and the SADC region - Demand for feminine hygiene, baby hygiene and pharmaceutical products (bandages, wool and swabs) - Shire Valley Transformation project 	<ul style="list-style-type: none"> - Unstable export market prices - COVID-19 - Cheap cotton products and by-products imports - Cotton pest and diseases

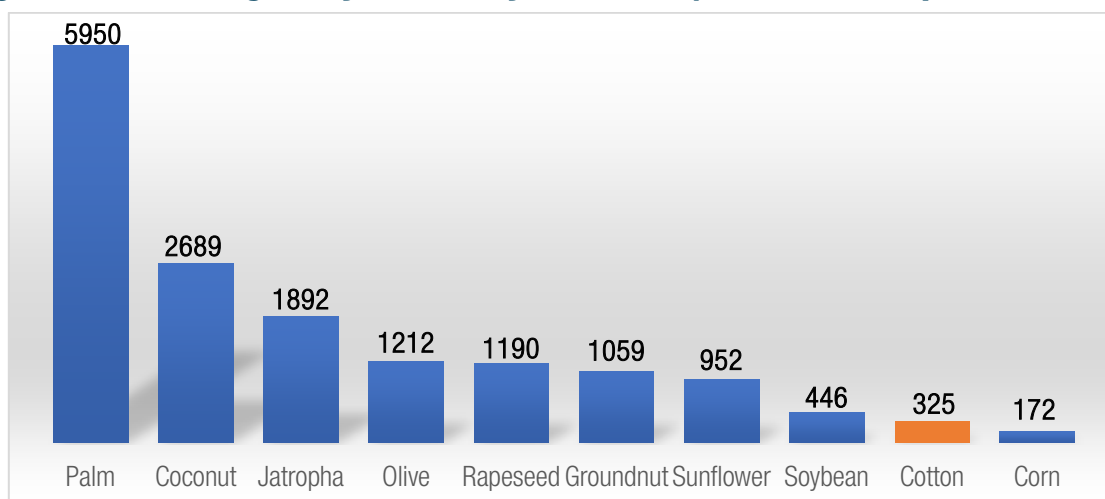
4.1 Cotton seed oil

Estimate of production potential

Malawi has become dependent on imported food products despite government policies that promote domestic food production and agro-processing. The total value of food imports more than doubled in the last decade. Following a large spike in food imports of about 64 per cent between 2015 and 2016, the country ended up with a food trade deficit of MK10.13 billion (US\$13.59 million) in 2016 and MK10.86 billion (US\$14.58 million) in 2017 (Munthali et al., 2021). Edible oils are among the 12 broad food categories that dominated Malawi's food imports.

Cotton seed has lower oil content relative to most other key oil seeds, apart from corn (Figure 4). Ranked by its oil yield per unit of land, cotton seed averages 325 litres per hectare, which is twice as much as corn. However, other edible oil seeds have much higher yields, the highest being palm with almost 6,000 litres of oil per hectare.

Figure 4: Average oil yield of key oil seeds (in litres of oil per hectare)



Source: Baffes (2010)

Research efforts that have only focused on maximising the quality and quantity of lint rather than on oil are partly to blame for the low oil content of cotton seed in Malawi. The Makoka Research Station breeding programme has no objective on improving the oil percentage of cotton seed. As a result, it is not the preferred choice of processors like Capital Oil Refining Industries Ltd (CORI).

The majority of cooking oil-producing firms import crude oil to refine locally. Beyond officially recorded food imports, Malawi is experiencing unregulated food imports from neighbouring countries (Zambia, Mozambique, and the United Republic of Tanzania), including cooking oil, because of high local prices. Following an increase in local cooking oil prices due to the imposition of a 16.5 per cent Value Added Tax (VAT) on refined oil in May 2021, Malawi started to witness a new wave of oil sales on unregulated markets along its border with Mozambique. In May 2021, a truck carrying alleged smuggled cooking oil from Mozambique was exposed after it got involved in an accident near Blantyre.¹⁵

The NAIP, NES, NAP and MCDS have all prioritised seed oil as a potential cluster for agricultural transformation, local job creation and export. The total demand for refined cooking oil in Malawi is 100,000 MT per annum, of which 60 per cent is for palm oil and 40 per cent for soybean oil. Soybean and sunflower production are 250,000 MT per annum, while 70,000 MT is smuggled into the country every year. The soybean and sunflower seed available to local crushers and animal feed producers is 180,000 MT, of which crushers use 140,000 MT per annum. From 140,000 MT of oil seed, 25,200 MT of crude oil can be produced, which yields approximately 23,000 MT of refined oil. Crushing capacity is 500,000 MT and cooking oil production capacity is 250,000 MT per annum. While producers are

¹⁵ <https://www.nyasatimes.com/truck-accident-along-chileka-magalasi-road-exposes-cooking-oil-smuggling/>

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crushing below capacity, crude oil is being imported to meet annual refined cooking oil demand. Refined palm oil is sold in rural Malawi because it is cheaper than soybean oil.

Analysis of market for cotton seed oil

Most edible oil markets are highly integrated with each other. Global production of the seven major oil seeds – soybeans, rapeseed, sunflower, peanut, cotton seed, palm kernel and coconut – averaged 585 million MT in the period 2016/17 through 2018/19 (ITC, 2020). Cotton seed ranked fifth, averaging at 42.5 million MT. Although the contribution of cotton seed oil to edible oils is small, most are close substitutes for each other. Therefore, the examination of the market for any edible oil should take into consideration all the (relevant) edible oils. Thus, policies targeting one edible oil market will inevitably affect all edible oil markets.

According to the International Cotton Advisory Committee (ICAC), the largest exporters of crude oils in 2018 were the United States, Malaysia, Kazakhstan, South Africa, and Turkmenistan. CORI imports crude oil from Japan, China, Egypt, Ghana, Zambia, Uganda, Kenya, India and others. It has also imported cotton seed from Zambia. In 2019, Malawi oil seed imports amounted to US\$3,3 million. Exports of oil seeds included groundnut (US\$28.4 million), soybean (US\$6.1 million), cotton seeds (US\$1.7 million) and sunflower seeds (US\$0.5 million). Hence, cotton oil has potential in Malawi. The fact that animal and vegetable fats are the second-largest imports next to cereals suggests that crushing cotton seed is a viable business. The fats from cotton oil could also become ingredients for making soaps and margarine.

Stakeholder analysis relative to oil by-products

The Edible Cooking Oil Association of Malawi (ECOAM) is an umbrella body of companies manufacturing edible oils. Market share of the five players in the industry is as follows: Capital Oil Refining Industries (CORI) Limited, 22 per cent; Sunseed Limited, 22 per cent; Meru, 20 per cent; Agri Value, 20 per cent; and Moti Oil Mills Limited, 16 per cent. Crushing capacity is presently underutilised, which gives room to absorb additional cotton seed oil crushing and refining.

There is a need to enhance the relationship of stakeholders in the edible oil value chain in order to bring back cotton seed into crushing and refining. Oil seed crushers and ginneries are business entities, and profit making remains their top priority. Thus, they control the local oil seed market and have a high impact on cotton seed crushing because they have state of the art equipment for refining seed oil that meets required standards for human consumption. The risk is that they may be less willing to invest in cotton seed crushing because of the low oil yield of cotton seed and access to cheap crude oil imports. However, round table

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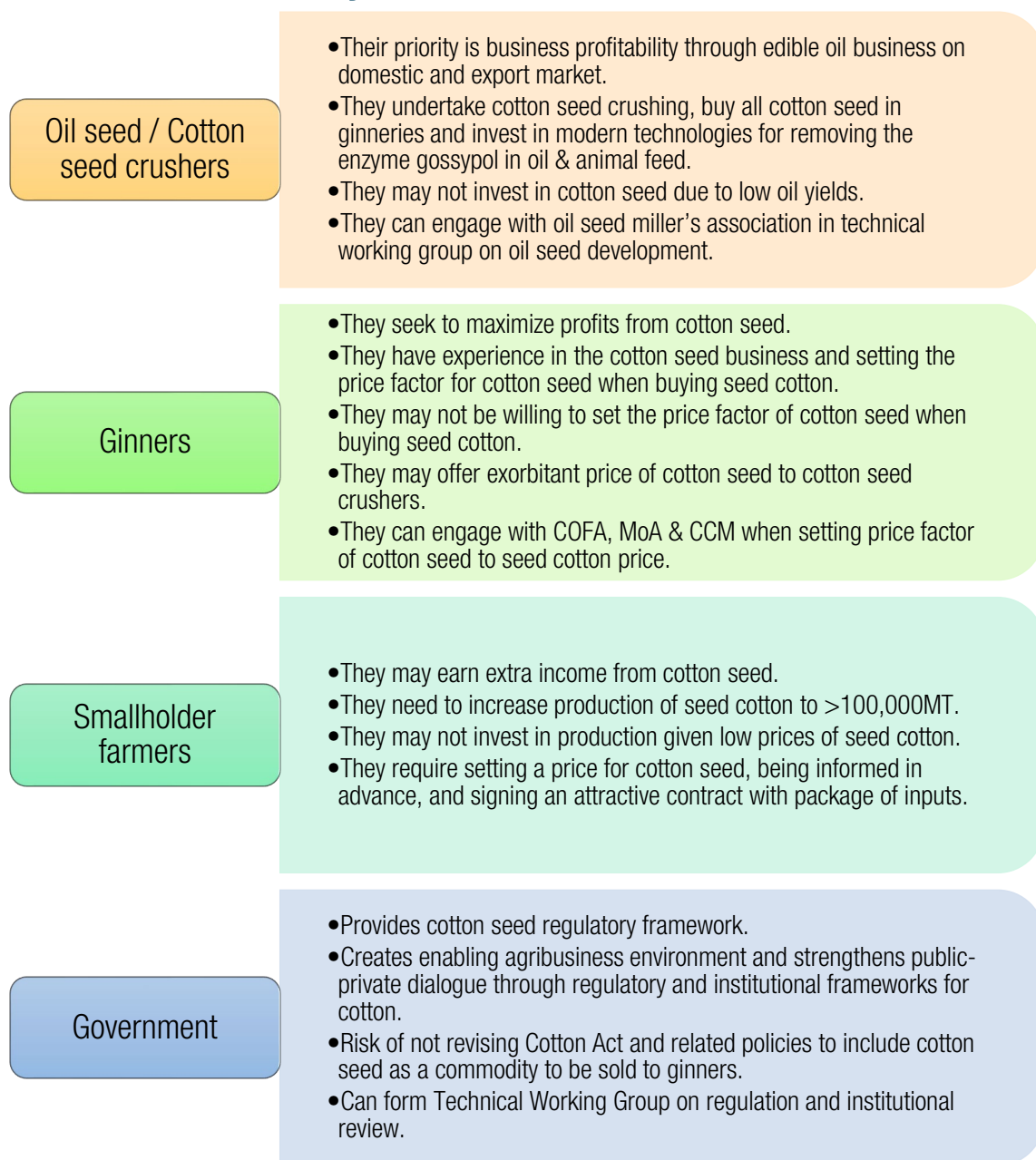
engagements with ECOAM may yield positive results because some crushers like CORI milled cotton seed oil in the past.

Ginners play a significant role in the development of cotton seed oil by-products as they buy seed cotton and extract cotton seed through the ginning process. The only risk is whether they are willing to accept a price premium on the seed when buying from smallholder farmers, as seed has not been priced over decades. Meanwhile, ginners do sell cotton seed on the export market and at times on the domestic market. Cotton seed generally fetched better prices on the export market. Hence, the tendency of ginners was to offer high prices to local crushers to prohibit millers from buying the cotton seed. The high price plus low oil yield of cotton seed made crushers opt for soybean, sunflower and other crude oils. Engagement of ginners with COFA, MoA and CCM on the price factor of cotton seed is necessary to establish a fair price that considers the value of the seed as a by-product.

Smallholder farmers' (producers) expectation is to have the seed factored into the price of seed cotton that they sell to ginners. Their withdrawal from cotton production is already having a high impact on cotton seed value chain development since seed volumes are directly related to cotton production volumes. Although MCDS has planned to increase cotton production, smallholder farmers may not be willing to invest in cotton given the history of low seed cotton prices. Therefore, setting a fair price for seed cotton to include cotton seed prices in contracts between ginners and farmers is important to stimulate cotton production in Malawi. Another mechanism that should be explored is to strengthen farmer organisations so that they own ginneries to process their seed.

The Government of Malawi, through CCM, is responsible for creating an enabling business environment and strengthening public-private dialogue by setting the regulatory and policy framework on cotton. Although the government has put in place numerous laws and policies on trade, agricultural production, and industry, challenges remain with regard to the tax regime imposed on domestic seed oil manufacturers and supporting them in terms of raw material supply. The Cotton Act needs to set rules related to cotton seed marketing to ensure that ginners sell a proportion of their cotton seed to local seed crushers at an attractive price. The Cotton Act should also be reviewed to include cotton seed as a commodity that can be sold. Figure 5 provides a visualization of the stakeholder analysis of the edible oil sector.

Figure 5: Stakeholder analysis of the edible oil sector



4.2 Cotton cake

Estimate of production potential

Cotton seed cake is a solid mass residual product obtained after the oil is extracted from the cotton seed. Table 4 provides the list of top exporters and importers of cotton seed oil cake and other solid residues in 2019. The top five exporters were the United States, Benin, Greece, the United Republic of Tanzania, and Burkina Faso. The top five importers were Mexico, South Africa, India, Lebanon, and Senegal¹⁶. At regional level, Malawi was the fifth

¹⁶ OEC <https://oec.world/en/profile/hs92/cotton-seed-oil-cake-and-other-solid-residues>

largest supplier of oil cake to SADC in 2013, with a volume of 29,124 MT. Its key product was cotton seed cake and main export market was South Africa¹⁷. It should be noted that these exports took place during peak cotton production with the help of CPUM. In addition, ginners such as Afrisian Limited and ADMARC export their cotton seed to South Africa where cotton seed crushers remove gossypol and produce high quality cotton cake to feed ruminants.

Table 4: Top 10 net exporters and importers of cotton seed oil cake and other solid residues in 2019

Top 10 Exporters in 2019 (US\$)		Top 10 Importers in 2019 (US\$)	
United States	29,055,743	Mexico	23,540,640
Benin	14,804,345	South Africa	12,793,958
Greece	11,367,907	India	8,206,006
The United Republic of Tanzania	10,687,755	Lebanon	8,121,598
Burkina Faso	6,934,188	Senegal	5,910,390
India	6,639,058	Syrian Arab Republic	5,248,865
Azerbaijan	5,510,538	Republic of Korea	5,117,967
Kazakhstan	5,238,421	China	4,926,520
Argentina	4,448,442	Turkey	4,865,255
Zimbabwe	3,961,585	Uzbekistan	4,509,515

Source: The Observatory of Economic Complexity

The local market for cotton seed cake is relatively small and under development. Cotton producing districts are also cattle rearing districts in Malawi, where cattle farmers graze their cattle on free range with no supplementary feeding. Interviews with Gwirawekha Ranch, Sangiza Farm, Africa Cattle Farm, Zachilomwe Farm, Khama Cattle Ranch, Majoti Farm, and Ekhaya Farm revealed that they feed their cattle with sunflower oil cake and pigeon peas because edible oil millers no longer produce cotton oil cake. There are large ranchers in Chikwawa district who used to feed their cattle with cotton oil cake on a limited scale. Similarly, in Karonga, a local cattle farmer once bought cotton seed to feed his cattle. The experience of other countries in the region confirms that cotton oil cake is challenged by the

¹⁷ https://mitc.mw/trade/images/Regional_Oilcake_Demand_Executive_Summary_141202.pdf

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enzyme gossypol which inhibits absorption of nutrients, especially for cattle. This issue was not mentioned by interviewed processors and ranchers.

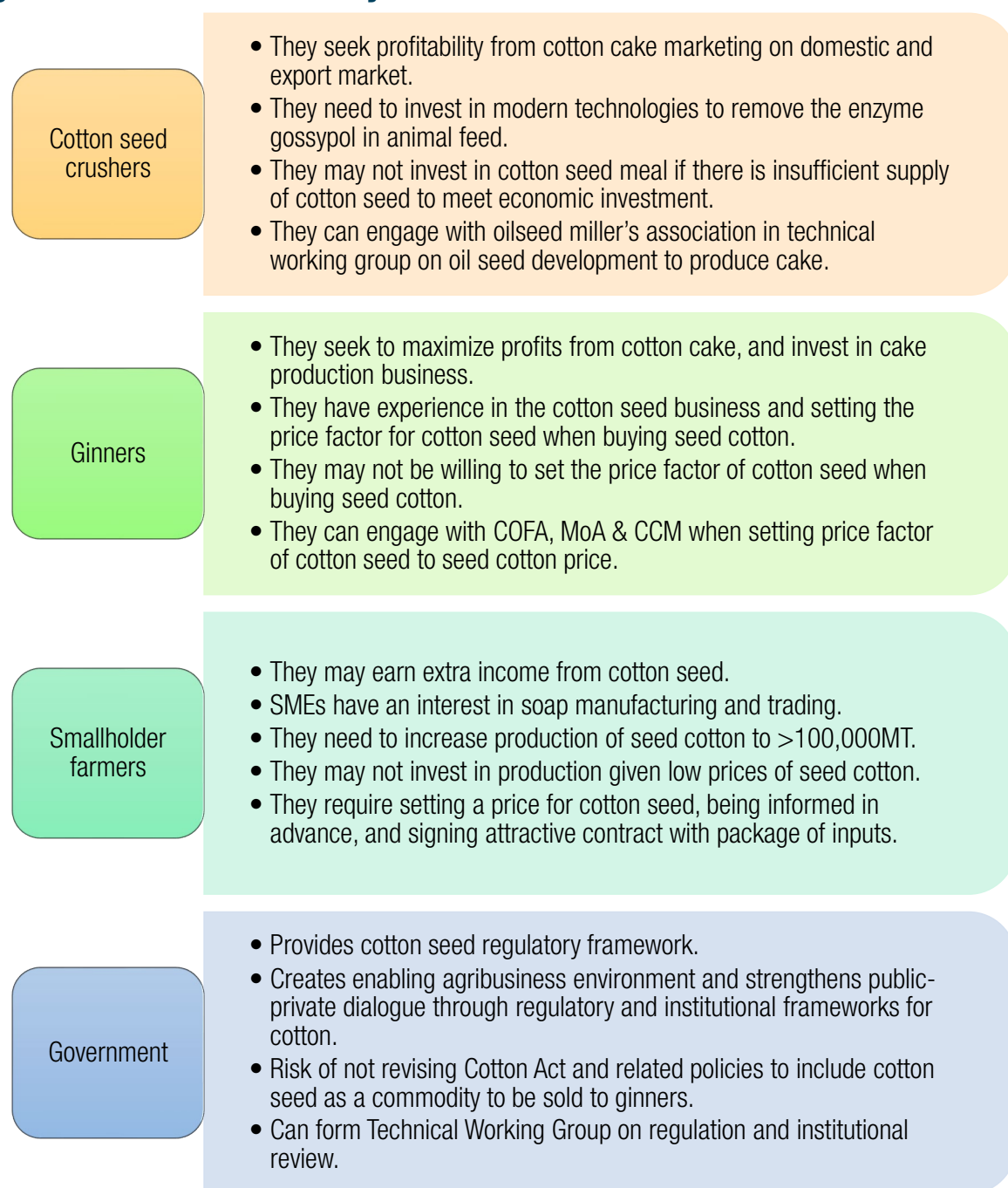
The main threat facing cotton seed cake is lack of cotton cake production by oilseed miller companies in Malawi. Ranchers argued that if there was no production of cotton seed oil, obviously, there would be no cake for cattle. Malawi needs to establish the baseline data on the actual demand and challenges for cotton oil cake which can inform research on potential by-product development. Investors could take advantage of ECOAM member companies that are already in the feed making business for poultry and ruminants from soybean and sunflower as an opportunity to build upon for cotton cake manufacturing and marketing.

Stakeholder analysis relative to cake by-products

The stakeholder analysis in Figure 6 shows that cotton oil cake production depends highly on cotton seed crushers (seed oil millers). The fact that they are less willing to reinvest in cotton seed crushing for oil means that production of cotton oil cake may not be sustained. However, oil crushers blame the lack of adequate cotton seed and low oil yield of cotton seed per kilogram of seed crushed. This gap calls for investment in research to improve cotton seed oil yields. As a result, the cotton seed produced in Malawi ends up being exported to South Africa for crushing and cotton oil cake production. This situation does not have a negative impact on the business of ginners as they continue to earn income from seed exports despite the absence of domestic cotton seed crushers. Exporting unprocessed cotton seed is equivalent to exporting hundreds of jobs. Hence, it is in the interest of small and medium-sized enterprises to manufacture and trade soap that is derived from cotton seed.

Key issues of the stake, impact, needs, risk and management strategy remain the same for smallholder farmers and the government as in the case for oil by-products (see section 4.1 above).

Figure 6: Stakeholder analysis of the cotton oil cake sector



4.3 Cotton linters

Estimate of production potential

Linters are fuzzy short fibres which form a dense mat that adheres to the surface of cotton seed. Every ton of cotton seed can generate around 75 kilograms of linters (ITC, 2020). Linters are removed from the seed surface by de-linting machines. Based on the de-linting process adopted, linters are classified as first cut, second cut, and mill run. The high-grade pulp is good raw material for preparing viscose grade fibres, cellulose acetate, cellulose nitrate,

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specialty grade paper and microcrystalline cellulose. Cotton linters can potentially be used to make various pharmaceutical products including hospital wool and feminine hygiene products (United States Department of Agriculture, 1995). During the cleaning of cotton linters, about 20 per cent of dust is generated, which contains a high percentage of lignin (from seed coat fragments), apart from cellulose, pectin and ash. It has been found that this material can be fed directly into cow dung-based biogas plants to obtain better methane production. Even through batch digestion of this material, it is possible to produce about 600 litres of biogas per kg with a 45-day retention time. The methane content would be around 60 per cent.

In Malawi, linters are not utilised to manufacture by-products. However, Mapeto David Whitehead and Sons (DWS) Limited manufactures ropes used in tobacco and cotton bailing. Some common medical by-products used in Malawi are bandages, cotton buds and cotton balls. During oral interviews, ADMARC revealed that manufacturing medical supplies from linters was one of the bankable businesses they were working on for the near future. Currently, most of the linters they produce are either exported or destroyed, resulting in a missed opportunity. Furthermore, there is a growing market for use of linters in sanitation,¹⁸ feminine hygiene and baby hygiene. Sanitary products available on the market include sanitary napkin, sanitary towel, sanitary pad, menstrual pad, and maxi pad. Although the market of sanitary pads was yet unquantified in Malawi, there is much to learn from the South Africa sanitary pad market, as Malawi imports most of its sanitary products from South Africa.

It is essential for companies to actively plan their ventures into the sanitary pads (feminine hygiene) market due to the ongoing large-scale uncertainties induced by the COVID-19 pandemic. Frequent lockdowns are likely to create a shortage of sanitary products because of the closure of industries and restrictions on the movement of goods. Hence, it is important for the government to provide an enabling operating environment in the market for sanitary pads. Purity Malawi is already in the sanitary pad manufacturing business¹⁹. The Malawi Government may facilitate venture capital access for companies such as Mapeto (DWS) Limited, which are working on the feasibility of diversifying into the booming feminine and baby hygiene products market. It is also essential for Malawi to become more self-sufficient through the domestic production of sanitary pads, so that the supply of such essential products is resilient to market shocks like the one experienced due to COVID-19 lockdowns.

¹⁸ Sanitary Pads (Feminine Hygiene) Market in South Africa - Outlook to 2025; Market Size, Growth and Forecast Analytics (updated with COVID-19 Impact). <https://www.marketresearch.com/GlobalData-v3648/Sanitary-Pads-Feminine-Hygiene-South-14518305/>

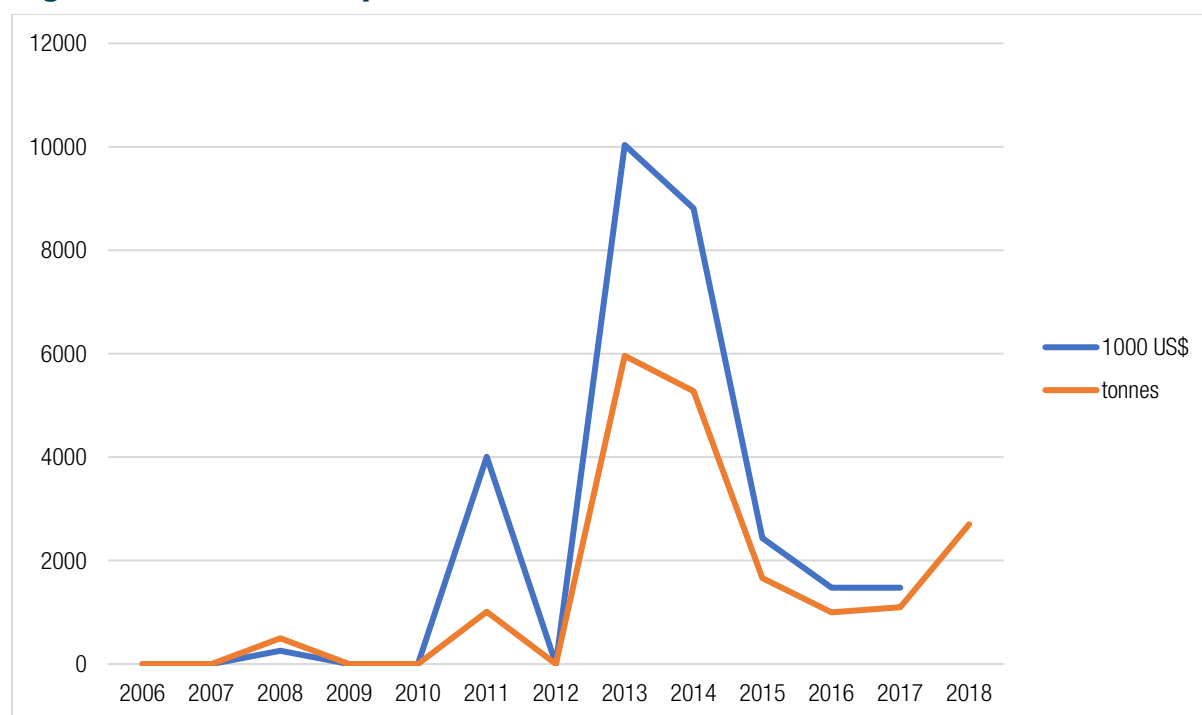
¹⁹ Purity Company. <https://www.puritymalawi.mw/products-napkins.html>

Analysis of market for cotton linters

Potential markets for linters have been identified in China, Singapore, India and the SADC countries. The demand for felting linters is directly related to the demand for bedding, furniture, and automobiles, which are major outlets for such linters. In 2019, top exporters of cotton linters pulp were United States, China, and Uzbekistan, while top importers were European Union, Republic of Korea, and Japan.²⁰

Malawi has been exporting cotton linters since 2007 (Figure 7). During the seasons 2011/12, 2012/13 and 2013/14, the country experienced its highest seed cotton production levels with average yields for the three seasons of 148,000 MT. This explains the high export of linters in that period, because peak levels of cotton production led to the availability of high volumes of linters after ginning. Linters exports reached US\$10 million in 2013, but then dropped as of 2015 through 2017, in parallel to the fall in cotton production. Exports of linters started to pick up again in 2018.²¹ Major importers of linters from Malawi between 2007 and 2019 were Zimbabwe, Bangladesh, United Arab Emirates and Thailand.

Figure 7: Malawi exports of cotton linters



Source: FAOSTAT

²⁰ World Integrated Trade Solution
<https://wits.worldbank.org/trade/comtrade/en/country/ALL/year/2019/tradeflow/Exports/partner/WLD/product/470610>

²¹ FAOSTAT 2018. <http://www.fao.org/3/ca7239en/ca7239en.pdf>

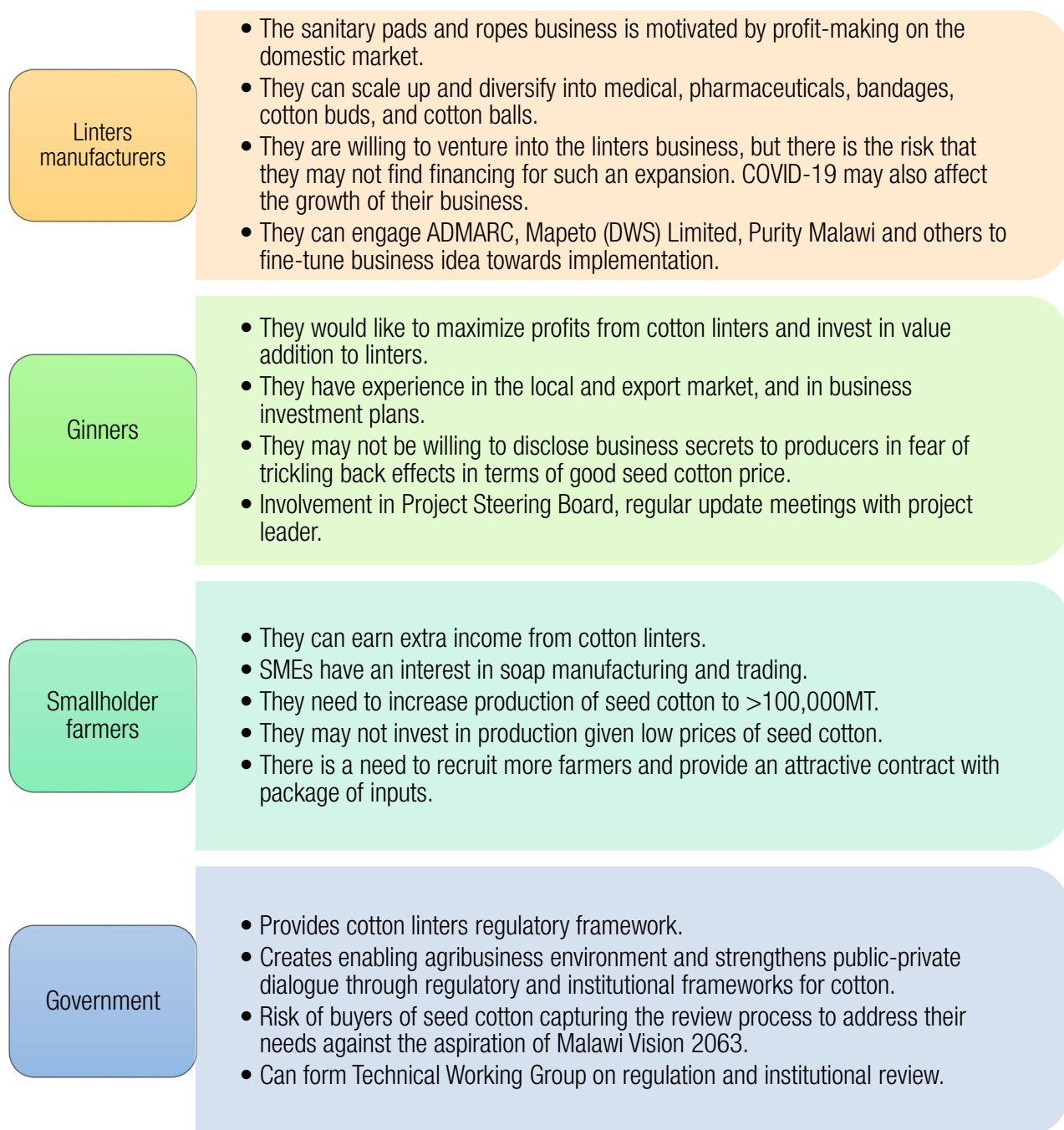
Stakeholder analysis relative to linters

Linters development in Malawi has so far been at an embryonic stage because a very narrow range of products is marketed. The only manufacturers are Mapeto (DWS) Limited and Purity Malawi, which produce ropes and menstruation pads, respectively. The linters stakeholder analysis in Figure 8 shows that there is a need for linters by-product manufacturers to scale up and diversify their product range into medical/pharmaceutical, feminine hygiene, baby hygiene products and ear buds, because these have been found to have a growing domestic market amidst COVID-19. Once the manufacturing sector is developed, it will stimulate the domestic market for linters. Ginnerers will benefit from the growth of the domestic market, and the benefits will trickle down to smallholder producers through employment creation for women, youth, and men. The suggested strategy to engage with existing and potential linters manufacturers is to facilitate the development of bankable businesses that can be funded by financial institutions.

The development of the linters value chain will build upon the vast experience of ginnerers who are to ensure that linters of sufficient quality and quantity is produced for the manufacturers. The risk in working with the ginnerers is that they may not disclose the true value of linters to smallholder producers because, for a long time, the seed cotton price only took into account the lint, while cotton seed was not embedded in the price. Therefore, there is no guarantee that value addition in linters will result in higher seed cotton prices to the benefit of smallholder farmers. CCM and COFA should engage with ginnerers to raise the price of seed cotton to factor in cotton linters, just as for cotton seed oil.

Key issues remain the same for smallholder farmers as in the case for oil and cake by-products (see section 5.1 and 5.2 above). SMEs have a business interest in manufacturing and trading bandages. The government is expected to contribute its fair share by working on regulations governing cotton linters since the present regulatory framework is obsolete. The Cotton Act of 2013, agricultural policies and trade and industrial policies are not aligned fully with Malawi Vision 2063, which aspires to the objective of an inclusively wealthy and self-reliant industrialised upper-middle-income country by the year 2063 that can primarily fund its own development needs. The regulatory framework needs to allow indigenous Malawians, including smallholder farmers, to participate in profitable segments of the linters value chain. The likely risk is that buyers of seed cotton alone may capture the review process and influence the regulatory framework to address their needs alone, and not the long-term aspirations of Malawi Vision 2063.

Figure 8: Stakeholder analysis of the linters sector



4.4 Cotton stalks

Estimate of production potential

Cotton stalk by-products are produced from biomass that becomes available after the harvest of seed cotton, which is rich in cellulose, hemicellulose and lignin. The cotton stalk is akin to most hardwoods, and therefore an excellent raw material for preparing composite boards, pulp and paper, and raising edible oyster mushrooms. In the United Republic of

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Tanzania, Uganda, Zambia and Zimbabwe, cotton stalks are used for producing briquettes and pellets that provide the fuel needed for cooking.

Briquetting can be defined as the process of converting low bulk density biomass into high density and energy concentrated fuel briquettes. The process of translating biomass into solid fuel involves drying, cutting, gridding and pressing with or without the aid of a binder (Lavanya et al., 2018). Stalk briquettes can be used as raw material when combined with coal or firewood to produce high quality fuel. Stalk briquettes are also environmentally friendly, as they do not produce as much smoke compared to charcoal (Nkomo, 2018).

Malawi has a population of over 18 million, of which only 11 per cent has electricity access (42 per cent of the urban and only 4 per cent of the rural population).²² Demand for bioenergy for cooking and industrial uses is high. Food and cooking energy are inseparable at the household level. Bioenergy is also used in boarding schools, and the tobacco and tea industry for curing (drying after harvesting the tobacco leaves from the field). Energy needs for cooking are mostly served by charcoal and firewood. The feasibility study found that 98 per cent of smallholder farmers' energy was supplied by biomass. Cotton stalks supplied some of the needed cooking energy where natural wood was scarce. Smallholder farmers who were involved in fishing in Lake Malawi used cotton stalks as fuel for drying fish. The majority of smallholder farmers left cotton stalks in the field and burned them as guided by the Cotton Act of 2013 'closed season' rule. While the cotton stalks were in the cotton field, cattle fed on them. Other uses of cotton stalks, such as making briquettes and particle boards were self-taught by some smallholder farmers.

Briquettes and pellets manufacturing have potential in Malawi because the policy and legal framework that promotes commercially viable briquette/pellet production is already in place. The Malawi National Charcoal Strategy 2017-2027²³ aims to professionalise and regulate the charcoal value chain based on a business model. The strategy builds market linkages to proximate industrial and institutional buyers (e.g., tobacco estates, hospitals, schools, etc.).

Malawi exports particle boards and similar boards of wood and other ligneous materials to South Africa.²⁴ Export markets for fibre boards are South Africa, Namibia, Zambia and Botswana. The only domestic competitor in South Africa is PG Bison. Raiply Limited is a Malawian company that manufactures biomass briquettes and pellets using timber waste

²² Sustainable Energy for All. 2021. SEforALL Africa Hub. <https://www.se4all-africa.org/seforall-in-africa/country-data/malawi/>. Accessed on 12 September 2021.

²³ National Charcoal Strategy 2017–2027. Ministry of Natural Resources, Energy and Mining

²⁴ United Nations COMTRADE database on international trade.

<https://tradingeconomics.com/malawi/exports/south-africa/particle-board-board-wood>

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such as sawdust, wood cuttings and wood offcuts. It is an Export Promotion Zone (EPZ) Company with guidelines to export 80 per cent of production and use 20 per cent for the domestic market. The domestic target market for Raiply Limited includes tobacco companies, hospitals, schools and tea estates that use coal for energy. Raiply produces and exports medium density fibre particle boards (density of 590-800kg/cubic metre). There are also small/medium scale briquette and pellet producers distributed across the country. Farmer organizations in cotton-growing districts should explore partnerships with commercial companies such as Raiply to utilize cotton stalks, in line with Malawi National Energy Policy (2018) Priority 2 on Biomass: “Government will build strong partnerships with the private sector and NGOs (including PPPs) to promote the manufacture, supply, use and financing of biomass briquettes and pellets”.²⁵

The Food and Agriculture Organization Bioenergy and Food Security (BEFS) study in Malawi identified that different briquette investment models (manual technology and more advanced piston technology) may be adapted for smallholder farmers, middle income households/groups and commercial producers (FAO, 2018a). Larger producers may build on their existing financial capacity and experience to expand their business in briquettes, but the challenge would be the limited supply of cotton stalks to operate the manufacturing machine with a capacity of 2.5 MT per hour throughout the year. The management strategy at both smallholder farmer and commercial producer level would involve the promotion of diversification to bring in other types of wood and agricultural waste to supplement the cotton stalk supply in the factory. The FAO study outlined the number of jobs that could be generated by briquetting plants of different size and complexity, as well as investment needs. A more comprehensive analysis of the investment profiles of required infrastructure for cotton stalk-based by-products is foreseen in a potential second phase of the current feasibility study.

Stakeholder analysis relative to cotton stalk by-products

Figure 9 provides the stakeholder analysis of the cotton stalk sector. Since firewood is considered as cheap compared to other sources (such as electricity and briquette) and free for the majority, there is a need for a mindset change of firewood consumers to consider other forms of cooking energy. At the same time, particle board and medium/small-scale briquette manufacturers are needed to guarantee availability of briquettes throughout the year.

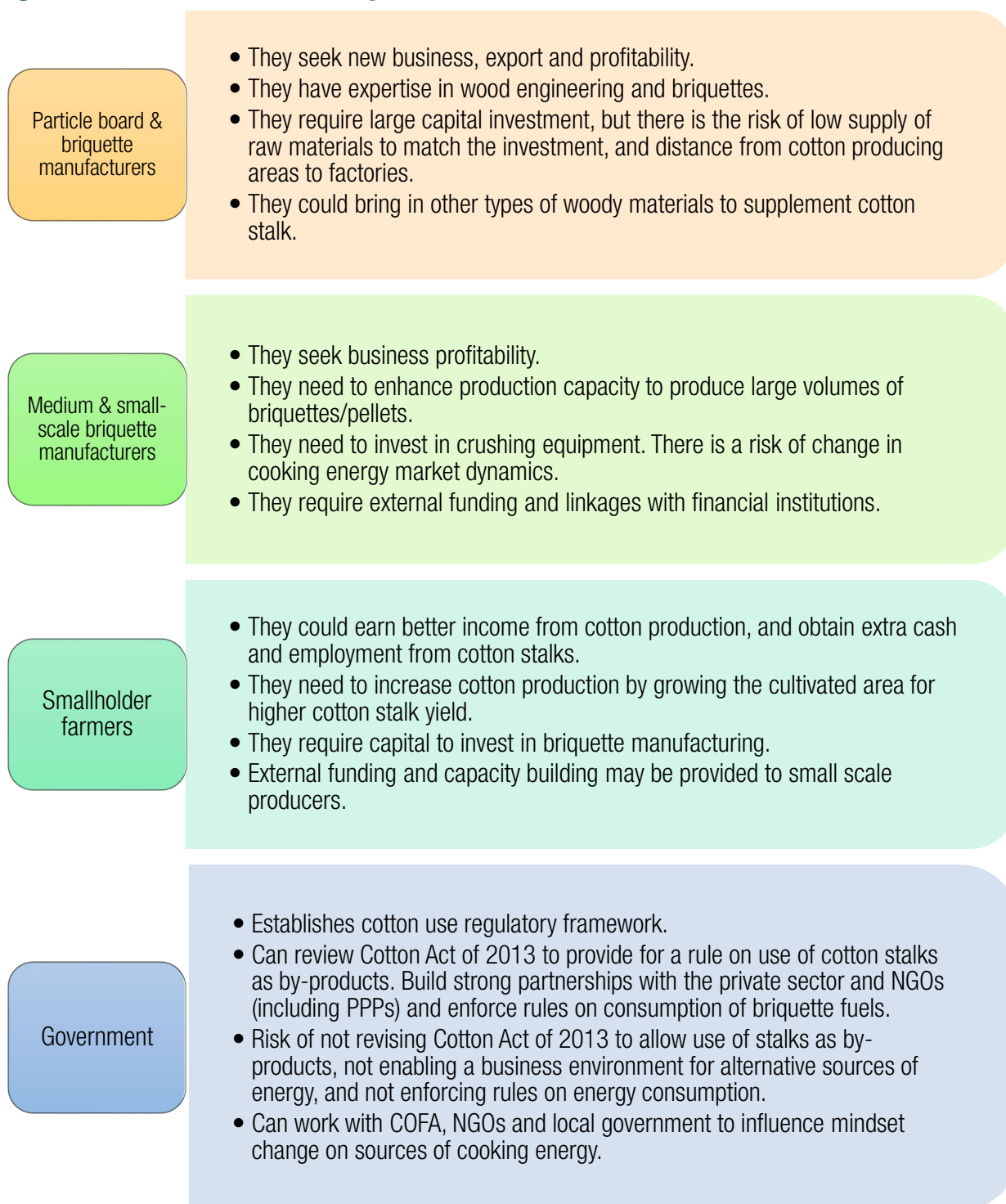
²⁵ National Energy Policy 2018. Malawi Government.

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The stake of smallholder farmers remains better income from cotton production, as before. Briquette making is considered to have potential for job creation and extra income. Smallholder farmers need to increase production of seed cotton, which would translate into increased volume of cotton stalks for manufacturing particle boards and briquettes. Therefore, smallholder farmers' willingness to grow cotton is essential to investing in the cotton stalk by-product value chain. Farmers need external financial support and training to run briquette and pellet-making equipment such as crushers and compressors. The option of blending cotton waste and other locally available woody materials was suggested to ensure briquette production throughout the year.

Currently, the Cotton Act stipulates that all cotton residues in cotton fields must be uprooted and burned. As a result, 75 per cent of cotton stalks are burned in the field, while 10 per cent is used as firewood, 5 per cent is ploughed back, and 10 per cent is stacked on bunds (ICAC, 2021). The government needs to review the regulatory framework in the Cotton Act of 2013 to give provision for the use of cotton stalks as a by-product in manufacturing other wood products and the supply of heating and cooking energy. This would help to build strong partnerships with the private sector and NGOs (including PPPs), and enforce rules on the consumption of briquette fuels. The main risk would be the failure to revise the Cotton Act, and failure to create an enabling environment to invest in alternative sources of energy and enforce rules on energy consumption. The suggested mode of engagement for the government is to influence a mindset change on sources of cooking energy with cotton farmers' cooperatives, AICC and other NGOs in the energy sector, and local government, to open up the briquette market in Malawi.

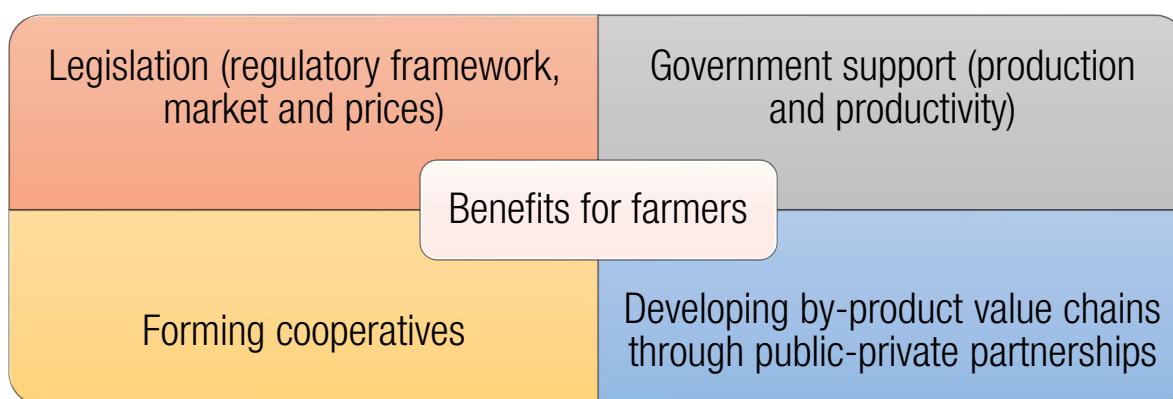
Figure 9: Stakeholder analysis of the cotton stalk sector



Chapter 5. Recommendations

The study has shown that seed cotton production in Malawi has been on the decline for a decade and hit its lowest point in 2021. The development of cotton by-products depends on the performance of the whole cotton ecosystem, as well as each specific segment of the value chain. For example, if seed cotton production is low, it means that production of linters, cotton seed oil, and stalks will be low as well. Hence the study, considering KIIs, FGDs, farmer perception as per survey responses and SWOT analysis, recommends the following adjustments to the benefit of smallholder cotton farmers under legislation, government support, cooperatives, and developing cotton by-product value chains.

Figure 10: How farmers can benefit more from cotton by-products



5.1 Legislation

Recommendation 1: Review the Cotton Act of 2013.

The current Cotton Act is limiting the development of by-products from cotton stalks and cotton seed. The Cotton Act requires all cotton stalks to be burned after harvest, and does not recognize the value of the cotton seed. It is important to amend the Cotton Act to provide for stalks and cotton seed as products to be marketed by farmers. The amendment should be accompanied by relevant guidelines on the use of cotton stalks. It should support the development of domestic industry as well, so that the cotton stalk collected not only leads to export income, but also meets local demand for briquettes and pellets.

Currently, the regulatory capacity of CCM is not sufficient to enforce the provisions of the Cotton Act of 2013. CCM functions as an implementer and microfinance provider (giving loans), which goes beyond its mandate as a regulator. Two recommendations are made: 1) CCM should strengthen its technical, financial, and structural capacity by recruiting more staff; and 2) CCM should discontinue the provision of loans and extension services.

Recommendation 2: Creation of an improved regulatory framework to allow for a competitive cotton industry.

The seed cotton market is unstructured in Malawi. The fragmented market depends on ginners who run several collection and buying centres close to the farmer. The bought seed cotton is transported and weighed at the ginners' weighbridge before warehousing. CCM has no direct access to these weighbridges. The ginners' declarations of bought seed cotton is prone to under-declaration to reduce their levy remittances to CCM because of lack of robust monitoring of market performance. Therefore, the cotton and by-products market should be structured into one large commodity exchange market powered with digital technology. Three structured markets are proposed as a pilot:

- Chikwawa and Nsanje should have an aggregation centre at Chikwawa
- Balaka, Mangochi and Zomba should have an aggregation centre at Balaka
- Salima and Nkhotakota should have an aggregation centre at Salima.

The following infrastructure will be needed at each aggregation centre: warehousing facilities, weighbridge and forklifts, office buildings and equipment (computers, furniture), vehicles and energy. CCM aggregation centres will thereby capture data on seed cotton and by-product sales in real-time and collect levies and loan repayment on each kilogramme sold.

Recommendation 3: Reliable, stable and improved prices for seed cotton.

The Ministry of Agriculture, for three decades, has been setting minimum prices of agricultural commodities, including seed cotton sold at ginneries. For example, seed cotton minimum prices in 2021 buying season were set by the Ministry of Agriculture, CCM, COFA, ginners, and AICC. The Ministry of Agriculture announces the Farm Gate price before the agriculture produce markets open every year. Seed cotton prices have been based on negotiations between grower representatives and ginners, with oversight from the Ministry of Agriculture. The study observed that there are two major shortcomings in the current method of setting minimum farm gate prices:

- 1) Gross margin calculation that uses the cost of production at the beginning of the season, which is insensitive to changes in markets and the broader economy.
- 2) The involvement of ginners (buyers)/exporters of lint and cotton seed in setting prices.

Hence, guidelines on how to calculate the farm gate price should be revisited to make seed cotton and by-product prices more responsive to market dynamics (input, logistics, etc.). The study proposes the use of the inflation-adjusted input price before produce markets open in May/June instead of relying on the input price at the start of the growing season in the previous October, as is the case with the fuel pump price response to the broader market

crude oil prices. It is necessary to liberalize the agricultural commodity market to respond to the broader market economy. Moreover, seed cotton pricing should include the price of cotton seed and linters so that smallholder farmers can earn extra income. This will help bring smallholder producers out of the vicious circle of poverty.

5.2 Government support (production and productivity)

Recommendation 4: Increase cotton production and productivity.

Cotton production and productivity are central to the development of by-products. At present, the barriers to cotton production and productivity are poor timing of providing cotton seed for planting and expensive inputs. The seed is brought on the market when smallholder farmers had already spent their cash earned from seed cotton sales, so the timing is counterproductive. The current price of K22,000 (US\$27.08) per kg of cotton seed is expensive in comparison to its productivity. Hence, 1) CCM and ginners should synchronise cotton seed sales with the seed cotton market. Cotton seed should be sold alongside pesticides. 2) The government should consider reducing the seed price by treating cotton inputs in the same vein as fertiliser for maize production under the Agriculture Input Programme (AIP). The government should ensure that the cotton seed market is functional, and seed is available, accessible, and affordable to smallholder farmers.

Currently, there are few qualified staff that provide extension advisory services in the cotton sector. The government should develop a vibrant and coordinated cotton extension system to achieve widespread adoption of technologies towards increasing production. Recruiting qualified extension staff by the government should be encouraged. Recruitment of extension staff by the private sector and NGOs is also a positive development for the cotton sector and should be regulated to ensure that required qualifications are met.

5.3 Cotton producers

Recommendation 5: Establish cooperatives for better bargaining in matters of cotton marketing and commercialization.

Cotton is produced by smallholder farmers in Malawi, who are currently organised in the form of clubs (associations) housed under COFA that obtain credit from ginners and organize the sales. These clubs provide collateral and collective responsibility and enable extension advisories to be provided more easily. However, they do not make it possible to add value to cotton and its associated by-products. In this arrangement, the primary focus of farmers is merely on seed cotton prices. Hence, COFA should be organized into cooperatives that are legally recognised as business entities by the Ministry of Industry.

Unlike associations, cooperatives can undertake vertical integration and play the role of cotton processor and trader as well. The main advantage of a cooperative is that it operates for the benefit of its patron members. At the same time, since members are also the owners, they have an interest in the success of the cooperative which sways them toward giving it their full support and patronage. Cooperative members also have a voice in the control of the organisation. Within the limits of majority rule, the cooperative supplies the kind of services they ask for, such as guaranteeing credit or providing technical advice. The Ministry of Industry Roadmap to transform the cotton sector aims to let cooperatives become processors and exporters after learning from off-takers.

In addition to cooperatives, strengthening the inclusion of civil society organisations such as AICC and FUM in cotton value chains would allow them to lobby and advocate for a favourable legal and policy environment that promotes equitable business. They would be useful in providing checks and balances on various policies and legal instruments promoting the cotton business, so that smallholder farmers can earn extra income from cotton by-products.

5.4 Developing by-product value chains through public-private partnerships

Recommendation 6: Develop cotton by-product value chains through public-private partnerships.

The study identified the following priority cotton by-products for Malawi:

1. The cottonseed oil value chain has potential. Imports of crude edible oils are high because of shortfalls in the local supply from soybean, sunflower and groundnuts. Instead of exporting its cotton seed, Malawi could utilize it in the local manufacturing of cooking oil to offset part of the shortfall covered by crude oil imports. Edible oil manufacturing from cotton seed has potential, based on the experience in 2016 on cottonseed oil crushing by CORI and sale in supermarkets. Hence, it is highly recommended that CCM re-engages with CORI.
2. Feminine and baby hygiene products have growing market potential in Malawi and SADC as well. Much of feminine and baby hygiene products are imported into Malawi. Should new pandemic waves occur in the future, the import of these products is expected to be more challenging. Hence, domestic production should be promoted to meet demand.
3. Pharmaceuticals manufacturing is a potential value addition sector to meet the growing demand for products such as bandages, absorbent wool, cotton buds and cotton balls

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in hospitals and pharmaceutical companies. SMEs have prioritised bandage and soap manufacturing and should be supported to invest in these two by-products in Malawi.

4. There is high demand for bioenergy as observed through firewood and charcoal demand. PPPs are recommended to develop briquette and pellet by-products, and to run the finance, management, manufacturing, and market development functions.

In terms of operationalizing the by-product value chains, the study identified that currently there is low interest in by-product manufacturing by industry players, for example, cotton seed crushers and cake manufacturers. PPPs are recommended to undertake research towards improving cotton seed oil yields and develop technologies on gossypol extraction at Makoka Research Station, and to invest in infrastructure in the feed and oil industry.

The government should develop a policy and regulatory framework on the by-product value chains of cotton seed, cotton stalks and linters that is aligned with Malawi Vision 2063. Government support is needed to ensure that domestic industries have enough seed to operate their business. The Malawi Bureau of Standards should be an integral part of all cotton by-product sectors to certify product standards for local and export markets.

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Annexes

Annex: 1: List of participants in Focus Group Discussions

No.	Name	Gender	Position/Role
1	Lyness Sichali	Female	Chairlady (COFA)
2	Steward Kenedy	Male	Deputy Chairman
3	Francis Nasho	Male	Secretary
4	Kester Sichali	Male	Deputy Secretary (COFA)
5	Frighton Bishop	Male	Lead Farmer
6	Boxes Thomas Zuda	Male	Lead Farmer
7	Zefania Dyanjowo	Female	Lead Farmer
8	Charles Galliwao	Male	Farmer
7	Chiukkumbutso Mwanyama	Female	Farmer
10	Elias Wilson	Male	Farmer
11	Jenifer Moses	Female	Farmer
12	Tembo Geoffrey	Male	Farmer
13	Kafileni Elason	Female	Farmer
14	Sophilet Magaso	Female	Farmer
15	Gift Johnson	Male	Farmer
16	Enock Bishop	Male	Farmer
17	Isaac Felekeza	Male	Farmer
18	Snake Makina	Male	Farmer
19	Conex Ngalu	Male	Farmer
20	Amosi Dalani	Male	Farmer
21	Emily Josephy	Female	Farmer
22	Steven Wisitidi	Male	Farmer
23	Chimwemwe Gizimo	Male	Farmer
24	Robert Nasho	Male	Farmer
25	Dorice Tenison	Female	Farmer
26	Willy Namizinga	Male	Farmer
27	Damiano Haward	Male	Farmer
28	Matilda Besten	Female	Farmer
29	Zefania Magalasi	Female	Farmer
30	Alinafe Lamos	Female	Farmer
31	Jackson Chibowa	Male	Farmer
32	Benito Buwawa	Male	Farmer
33	Adrew Band	Male	Farmer
34	Jeremiah Kamfuti	Male	Farmer
35	Matias Boisi	Male	Farmer
36	Alfred Muoza	Male	Farmer
37	Cleva Ginio	Female	Farmer

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No.	Name	Gender	Position/Role
38	Gideon Sawamba	Male	Farmer
39	Thomas Paulino	Male	Farmer
40	Assan Jeremiah	Male	Farmer
41	Sweet Gabriel	Male	Farmer
42	Gladys Mwanjamo	Female	Farmer
43	Daniel Kazinga	Male	Farmer
44	Matias Kabongo	Male	Farmer
45	Biswas Chiomba	Male	Farmer
46	Frackson Evetson	Male	Farmer
47	Piteti Mlenga	Male	Farmer
49	Nengo Retus	Female	Farmer
50	Feston Chabwera	Male	Farmer
51	Ellen Gondwe	Female	Farmer
52	Kwame Munthali	Male	Farmer
53	Laida Sichali	Female	Farmer
54	Margret Mwafuliwa	Female	Farmer
55	Vincent Mwambero	Male	Farmer
56	Ipyana Mwambero	Male	Farmer
57	Tionge Kosamu	Female	Farmer
58	Bornface Munthali	Male	Farmer
59	Nickson Kandono	Male	Farmer
60	Wiseman Sichali	Male	Farmer

Annex 2: Key Informant Interviews

No.	Name	Gender	Position/Role
Ministry of Agriculture			
1	Martin Kausi	Male	Deputy Director Crops, Department of Crops Development, MoA
2	Innocent Nkangala	Male	Deputy Director of Livestock Development, MoA
3	Pearson Soko	Male	Chief Agribusiness Officer, Department of Extension, MoA
4	Jassie Mvula	Female	Cotton Breeder, Makoka Research Station
Blantyre Agricultural Development Division			
5	Erick M.K Haraman	Male	Programs Manager, BLADD
6	Getrude Msukwa	Female	Deputy Programme Manager, BLADD
7	Medson Thole	Male	Chief Land Resources Officer, BLADD
8	Geoffrey Maloni	Male	Divisional Crops Officer, BLADD
9	Getrude Kumwenda	Female	Principal Extension Methodology Officer, BLADD
10	Patrick Alufandika	Male	Monitoring & Evaluation Officer, BLADD

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No.	Name	Gender	Position/Role
Karonga Agricultural Development Division			
11	Medson Chikweyeye	Male	Principal Crops Officer, KRADD
12	M.D.K Lowole	Male	Cotton Officer, Karonga DADO
Shire Valley Agricultural Development Division			
13	J.D Mvula	Male	Principal Crops Development Officer, SVADD
Salima Agricultural Development Division			
14	Elidah Kazira	Female	Programme Manager, SLADD
Machinga Agricultural Development Division			
15	Mphatso Gama	Male	Chief Crops Development Officer, MADD
Ministry of Trade			
16	Charity Msonzo	Female	Director, Ministry of Trade
17	Cuthbert Chirwa	Male	Chief Economist, Ministry of Trade
18	Agnes Kapokosa	Female	Accountant, Ministry of Trade
Ministry of Industry			
19	Phangapanga	Male	Director, Ministry of Industry
20	Dickson Kazembe	Male	Chief Economist, Ministry of Industry
21	Philip J. Banda	Male	Ministry of Industry
Cotton Council of Malawi			
22	Madaika Cosmus Luwanda	Male	Executive Director, CCM, Lilongwe
23	Prisca Jamali	Female	Cotton Inspector, CCM
Agricultural Development and Marketing Corporation			
24	Michael James Mnenula	Male	Acting Director of Operations, ADMARC
25	P. Chilonda	Male	Ngara Cotton Ginnery, Karonga ADMARC
Afrisian Limited			
26	Dinesh Chandra Pant	Male	General Manager
27	Ananda Shriyan	Male	Financial Manager
Farmers Union of Malawi			
28	Jacob Nyirongo	Male	Chief Executive Officer, FUM
Cotton Farmer's Association			
29	Mbalafana	Male	Chief Executive Officer, COFA Malawi

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No.	Name	Gender	Position/Role
Edible Cooking Oil Association of Malawi			
30	Jayshree V. Patel	Female	Chairperson, ECOAM
31	Mohamed Ameen Nathanie	Male	Executive Director, CORI
Mapeto (DWSM) Limited			
32	Martin Mpata	Male	General Manager, Mapeto (DWSM)
Commercial Livestock Farms			
33	Issa	Male	Manager, Gwirawekha Ranch
34	Ishumael	Male	Manager, African Cattle Farm
35	Mpinganjira	Male	Manager, Ekhaya Farm
36	Chatama	Male	Manager, Zachilomwe Farm
Forestry Department, Mzuzu University			
37	Elisha Nguluwe	Male	Lecturer, Forestry Engineer, Mzuzu University