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Innovative Business Practices and Economic Models in the Textile Value Chain (InTex)

Eco-innovation Market Assessment Study: Textiles and Apparel Sector in Kenya

January, 2024

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Innovative Business Practices and Economic Models in the Textile Value Chain (InTex)

Eco-innovation Market Assessment Study:
Textiles and Apparel Sector in
Kenya

List of Abbreviations

AGOA	African Growth and Opportunity Act
AFA	Agricultural and Food authority (AFA)
CAPIL	Circular Apparel Policy Innovation Lab
CCC	Clean Clothes Campaign (CCC)
CEAP	Circular Economy Action Plan
CMF	Changing Markets Foundation
T&A	Textile and Apparel
Eco-I	Eco-Innovation
EPA	Economic Partnership Agreement
EPZ	Export processing zones
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse gases
GOK	Government of Kenya
GPP	Green Public Procurement Plan
ILO	International Labour Organization
InTex	Innovative Business Practices and Economic Models in the Textile Value Chain
ITC	International Trade Centre
KAM	Kenya Association of Manufacturers
KEBS	Kenya Bureau of Standards
KEPSA	Kenya Private Sector Alliance
KIE	Kenya Industrial Estates
KIEP	Kenya Industry and Entrepreneurship Project
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KITP	Kenya Industrial Transformation Programme
LCB	Life Cycle Boundary
NEMA	National Environmental Management Authority
PETA	People for the Ethical Treatment of Animals
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
NGO	Non-Governmental Organization
OEM	Original Equipment Manufacturer
PFAS	Per- and polyfluoroalkyl substances
SMEs	Small and medium-sized enterprises
UNEP	United Nations Environment Programme
UNDESA	United Nations Department of Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USD	United States Dollar
WHO	World Health Organization
WWF	World Wildlife Fund
WTO	World Trade Organization

1. INTRODUCTION

1. Introduction

1.1 Document Overview

Eco-innovation is a methodology developed by the United Nations Environment Programme (UNEP) that supports small and medium-sized enterprises (SMEs) in the development and application of a business model, shaped by a new business strategy that incorporates sustainability throughout all business operations based on life-cycle thinking and in cooperation with partners across the value chain. It entails a coordinated set of modifications or novel solutions to products (goods/services), processes, market approach and organizational structure, which leads to a company's enhanced performance and competitiveness.[1]

In the implementation of eco-innovation in the Innovative Business Practices and Economic Models in the Textile Value Chain (InTex) project, it is paramount to have prior knowledge and understanding of the Kenyan Textile Industry. This market assessment study for the Kenyan textile industrial sector was carried out according to the UNEP Eco-innovation Manual.[2] The study assessed the Kenyan Textile and Apparel (T&A) sector, its overall environmental, social and economic impacts; and the policy frameworks affecting it. At the industry level, factors considered include the industry's contribution to environmental problems, both on global pollution and the impact on climate change; non-renewable resource consumption; economic impact; and the role of institutions such as non-governmental organizations (NGOs) in promoting sustainability in Kenya. At the market level, the study gravitated towards the market growth and competition, government policies, customer influence and potential collaborations, all aiming at promoting sustainability in the textile industry.

1.2 Project Overview

UNEP is implementing a three-year project funded by the European Union (EU): Innovative Business Practices and Economic Models in the Textile Value Chain (InTex project). The project has five components; two components have global reach and three components focus on national implementation in three countries in Africa where textiles is a key economic sector. These countries have companies, including small and medium-sized enterprises (SMEs), as part of multinational value chains (e.g., exporting to the European market). Technical intermediaries from three countries (Kenya, South Africa, and Tunisia) are UNEP's partners implementing the three components that have a national focus. In Kenya the selected technical intermediary is Moi University. The objectives of the InTex project includes an increase of knowledge in the textile value chain, train stakeholders on sustainability, and provide evidence of environmental and socio-economic impacts of the different sustainable economic models in the textile and apparel value chain.

1.3 Methodology

The market assessment for the Kenyan textiles industry study falls within the framework of InTex project activities, which involves the implementation of circularity and eco-innovation in SMEs and technical assistance to textile SMEs. The market assessment study for the Kenyan textile industry was carried out according to the UNEP Eco-innovation manual,[3] with further reference made to the UNEP Eco-innovation textiles supplement. Other references from national, regional and international organizations were also considered.[4] The assessment goes beyond desk research and includes surveys and interviews to identify the nature and different trends of the textile market in Kenya, and the international trends that are shaping the T&A industry.

[1] UNEP (2022). Eco-innovation: Supporting small and medium-sized enterprises (SMEs) in sustainable business practices. Accessed on June 8, 2022. Available at: https://www.unep.org/eco-innovation
[2] UNEP (2022). Eco-innovation manual. https://unep.ecoinnovation.org/wp-content/uploads/2017/07/UN_Environment_Eco%E2%80%94i_Manual-1.pdf
[3] UNEP (2022). Eco-innovation manual. https://unep.ecoinnovation.org/wp-content/uploads/2017/07/UN_Environment_Eco%E2%80%94i_Manual-1.pdf
[4] UNEP (2022), Eco-I manual Textile supplement. https://unep.ecoinnovation.org/wp-content/uploads/2022/02/Eco-innovation-Manual-Textiles-Supplement.pdf

2. OVERVIEW OF TEXTILES AND APPAREL SECTOR IN KENYA

2. Overview of textiles and apparel sector in Kenya

2.1 History

The T&A sector in Kenya has undergone significant changes since the country gained independence in 1963. Subsequently, the Kenyan textiles and apparel sector experienced significant growth due to the government's implementation of import substitution initiatives, imposing elevated Import Tariffs on imported fabrics and apparel. Industrial and Commercial Development Corporation was used by the government to invest in T&A firms such as KICOMI, Mountex, RIVATEX and Fine spinners. Other privately owned textile factories, which included Raymonds, Sunflag and Thika Cloth Mills Ltd also flourished.[5] At its peak in the mid-1980's the T&A sector employed 30% of all workers in the manufacturing sector and was ranked second to the civil service as a source of employment, and the fifth contributor of foreign exchange.[6]

With the Kenya National Development Plan (1984-1988), the country adapted the Structural Adjustment Programs (Table 1), leading to trade liberalization and removal of protectionists measures.[7] Since then, the T&A sector in Kenya has experienced a drastic decline in domestic production from approximately 52 textile mills in 1983 to the current 15 mills, operating at 45% of total installed capacity. The decline is attributed to large scale importation of intermediate textile products, apparels, second-hand clothes and reduced local production of raw materials like cotton fibre and wool. Strategies adapted to resuscitate the Kenyan T&A sector included the establishment of the Export processing Zones (EPZ)[8] in Kenya (Table 1). The introduction of the African Growth Opportunity Act (AGOA)[9] in 2000 attracted more Foreign Direct Investment (FDI), revitalizing the Kenyan T&A sector. Other initiatives and policies include but not limited to Vision 2030[10] and the Big 4 [11]agenda and Manufacturing Priority Agenda (MPA) 2023[12] have also contributed to the revival of the T&A sector in Kenya.

[5] Nyagah, P. (2018). Revitalizing the Kenyan textile industry. Kenya Institute for Public Policy Research and Analysis. Retrieved from: https://kippra.or.ke/revitalizing-the-kenyan-textile-industry/

[6] Chemengich, M. E. (2013). Policy Research on the Kenyan Textile Industry: Findings and Recommendations. African Cotton & Textile Industries Federation. Available at: https://agoa.info/images/documents/5264/ACTIF%20Report%20on%20Policy%20Research%20on%20the%20Kenyan%20Textile%20Industry_Margaret%20Chemengich_2013.pdf

[7] Bukachi, F., Gitonga, D., & Kosgei, D. (2020). Effect of Customs Tariffs on the Financial Performance of Textile and Apparel Firms in Kenya. African Tax and Customs Review, 3(1), p9-16. Retrieved from: https://atcr.kra.go.ke/ojs/index.php/atcr/article/view/61

[8] Government of Kenya (2012). Retrieved from: Export Processing Zone Act. http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/ExportProcessingZonesAct_Cap517.pdf

[9] AGOA (2021). Retrieved from African Growth and Opportunity Act: https://agoa.info/profiles/kenya.html

[10] Government of Kenya (2018). Kenya Vision 2030. Available at: https://vision2030.go.ke/wp-content/uploads/2018/09/Kenya-Vision-2030-Sector-Progress-Project-Updates-June-2018.pdf

[11] Government of Kenya (2021). The Big 4. https://big4.delivery.go.ke/

[12] KEPSA (2023). The Launch of the Manufacturing priority Agenda (MPA) 2023. https://kepsa.or.ke/kepsanews/the-launch-of-the-manufacturing-priority-agenda-mpa-2023#:~:text=-Job%20Wanjohi%20stated%20that%20Manufacturing,Industrialize%20Agriculture%2C%20and%20SME%20Development

Table 1: Selected Policy regimes that have shaped the current T&A sector

Policy Interventions	Policy Contents	Bearing on T&A industry
Import substitution (1962-1986)	•Backward integration •High import tarrifs •Subsidy to increase yield	•Created employment and boosted cotton production •Government involvement reduced the cost to players along the value chain •Thriving of high capacity textile mills such as KICOMI, RIVATEX, MOUNTEX
Structural Adjustment Programmes (SAPs) (1986 to mid 1990s)	•Privatization •Fiscal discipline •Trade liberalization •Public sctor restructuring •Deregulation •Social safety nets •Monetary policy reform	•Reduction in international donor support •Loosening restriction on economic systems •Privatization of T&A companies •Outward-oriented development strategy •Inflow of secondhand clothes (Mitumba) •Beginning of T&A deterioriation •Loss of jobs in the production and processing nodes for cotton
Export Processing Act, 1990	Promote and facilitate export-oriented investments	Increased export of T&A goods Increased employment Increased FDI in the T&A sector Increased importation of Fabrics and accessories used in the EPZ factories
Bilateral agreements (AGOA)	•Market access to developed economies guaranteed without signed contract	•Diversification of Kenyan textile trade basket to the United States of America (USA) market Vision 2030 (Medium Term Plans) and Big Four Agenda
Vision 2030 (Medium Term Plans) and Big Four Agenda	•Blueprint to strategize competitiveness of CTA sector •CTA earmarked for promotion and value addition	•Performance remains unresponsive •Revival of RIVATEX •New variety Bt cotton •Cotton identified as a key industrial fibre crop that would stimulate growth and development as well as job creation

Source: Modified from KIPPRA[13] ,pg. 4

Kenya has maintained its position as the leading exporter of Apparel to the US market for over five consecutive years. In summary, the Kenyan T&A sector recorded a rise from 1960s followed by a decline in the 1990s and some revival thereafter. Efforts to revive the T&A sector have recorded some good signs for example in 2004,[14] the manufacturing sector accounted for 20% of GDP, employing 300,000 people in the formal sector and over 3.7 million in the informal sector.

[13] Malicha, W. & Njoroge, L. (2020). Assessing the Cotton, Textile and Apparel Sector Employment Potential in Kenya. https://kippra.or.ke/wp-content/uploads/2021/02/Assessing-the-Cotton-Textile-and-Apparel-Sector-Employment-Potential-in-Kenya.pdf

[14] Omolo J. (2006). The Textile and Clothing Industry in Kenya. Available at: https://library.fes.de/pdf-files/iez/03796/11kenya.pdf

The T&A sector employed 30% of the labor force in the manufacturing sector. In 2015, the sector posted a 24% increase in exports.[15] Economic activities in Kenya were notably subdued in the first quarter of 2019, relative to the performance recorded in the same quarter of 2018.[16] During the period, the economy expanded by 5.6% compared to 6.5% in the corresponding quarter of 2018 according to the Kenya National Bureau of Statistics.[17] The performance of the T&A sector has a long way to go if it were to regain its lost glory, since Kenya is still a net importer according to the import export data shown in Figure 1.

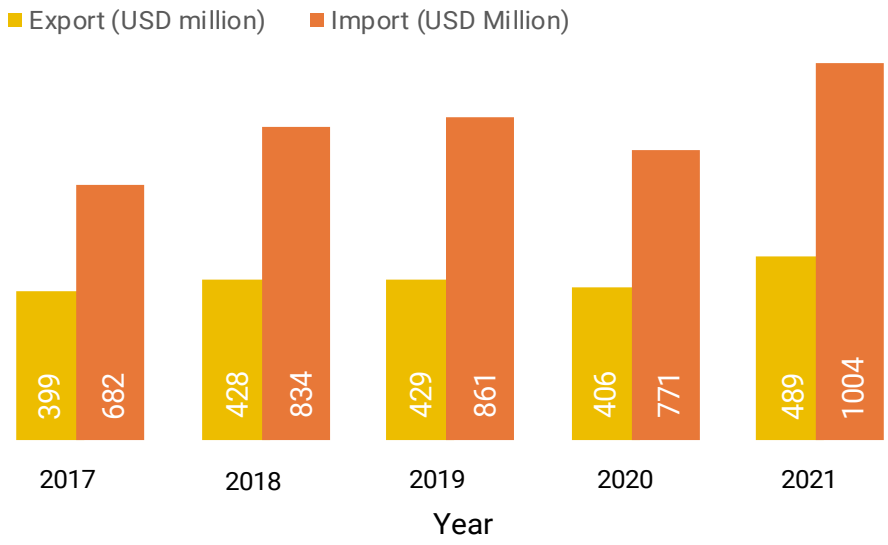

Figure 1: Kenyan T&A exports and imports between 2017 and 2021 (USDMILLION)
Source: ITC, 2023

2.2 Profile of the Kenyan Textile Industry

The textile sector plays a significant role in Kenya's economy. It creates both direct and indirect employment opportunities across various stages in the textile value chain, wealth creation, social-economic development, and driving industrial growth. The sector contributes about 14% of employment in Kenya.[18] It is estimated that it employs over 2.5 million people, of which 84% are employed in Micro Small and Medium Enterprises (SMEs), while 8% are employed indirectly in cross-cutting support services such as financial institutions, research institutes and government ministries. In 2017, the total revenue of the T&A sector in Kenya was Ksh. 62 billion.[19]

In terms of financial contribution, the total turnover of the sector is about USD 564 million. In 2021, Kenyan T&A exports were primarily apparels. The United States was the major destination for these exports, accounting for over 70% of total T&A exports. In 2018, it was estimated that the contribution of the T&A sector to Kenya's GDP was expected to continue growing from 10% in 2019 to 15% by 2022.[20] In 2021, Kenyan T&A exports were mostly apparels (Table 2) to the USA, which accounted for over 70% of total T&A exports.

[15] UNCTAD, 2020. Assessing cost-effectiveness of non-tariff measures, A tool kit – A case study in Kenya. Available at: https://unctad.org/system/files/official-document/ditctabinf2020d7_en.pdf
[16] Kenya National Bureau of Statistics (2019). Quarterly Gross Domestic Product report first Quarter , 2019. https://www.knbs.or.ke/quarterly-gross-domestic-product-report-first-quarter-2019/
[17] Data obtained from face-to-face interview with KNBS officials in Nairobi
[18] CEIC (2022). Key Information about Kenya Employed Persons. Accessed on May 22, 2022. www.ceicdata.com/en/indicator/kenya/employed-persons#
[19] Kippra (2020). Assessing the Cotton, Textile & Apparel Sector Employment Potential in Kenya. https://kippra.or.ke/wp-content/uploads/2021/02/Assessing-the-Cotton-Textile-and-Apparel-Sector-Employment-Potential-in-Kenya.pdf
[20] KAM (2018). Manufacturing in Kenya Under the 'Big 4 Agenda': A Sector Deep-dive Report. Available at: https://kam.co.ke/kam/wp-content/uploads/2018/10/KAM-Manufacturing-Deep-Dive-Report-2018.pdf

Table 2: Kenya trading partners (exports) in 2021

Export Partner	Apparel (USD million)	Fabric (USD Million)	Yarn (USD Million)	Fiber (USD Million)
US	351	0.2	0	0
UE	4	13.8	0	5.3
Nigeria	0	0.4	0.1	14.5
Uganda	8.5	2.7	3.2	0.3
Rwanda	3.3	1.6	1.7	0.2

Source: Computed from data obtained from www.trademap.org/

Kenya is one of the largest exporters of apparel under AGOA with about Ksh. 35 billion worth of exports in 2017. The industry is categorized into three tiers based on size and operation. There are 21 large companies operating under the Export Processing Zone (EPZ). These companies are mostly foreign-owned, Kenyan-owned, or a combination of both.

There are approximately 261 large and small scale garment manufacturing units operating in Kenya today, consisting of the EPZ apparel factories which constitute 29% of all EPZ enterprises, 78% of total EPZ local employment, 56% of EPZ exports, 52% of total EPZ sales and 30% of all EPZ private investment.[21] Brands having their products manufactured from the EPZs include Calvin Klein and Tommy Hilfiger. However, the success of the apparel factories in the EPZ has not trickled down to the local textile industry. The apparel factories in the EPZ continue to source for raw materials including fabric, sewing threads and accessories from Asia, where they are manufactured under Original Equipment Manufacturer (OEM). In addition to these, there are also companies operating under Special Economic Zones (SEZs), which offer special tax and infrastructure benefits to facilitate a wide range of activities including storage, export, and re-export.[22]

The leading import item for the T&A sector is fabric, mostly from China (Table 3). Generally, most of the work in apparel EPZ factories involve cut, make and trim (CMT), with all the designing, sourcing, and marketing (i.e., higher value addition activities) being done outside Kenya. Based on data provided by EPZ,[23] the imports by the garment factories at EPZ accounted for an average of 31% of Kenya T&A imports.

Table 3: Kenya Trade partners (imports) in 2021

Import Partner	Apparel (USD million)	Fabric (USD Million)	Yarn (USD Million)	Fiber (USD Million)
China	194	311	15	1.3
India	17	72	22	1.4
Pakistan	34	20	0.1	0
EU	31	3	2.3	0
Tanzania	13	14	1.5	1.8

Source: computed from data obtained from www.trademap.org/

[21] Textile Industry In Kenya (2021)- KohanTextile Journal, https://kohantextilejournal.com/textile-industry-in-kenya/
[22] Special Economic Zones. New Path to Industrialization. https://www.invest.go.ke/special-economic-zones/
[23] EPZA (2019). Export Processing Zone Program Annual Performance Report. Available at: https://epzakenya.com/wp-content/uploads/2020/09/EPZ-Annual-Performance-Report-year-2019.pdf

In an effort to reverse this challenging situation, the Kenyan Government, as part of the Kenyan Vision 2030, aims to use the T&A sector as one of the flagship sectors. This will propel Kenya towards achieving the goal of becoming a newly industrialized state.[24] Research[25] indicated that Kenya boasts of a higher production efficiency in the T&A sector in the East African region but faces challenges such as a dearth of technical and managerial talent, poor infrastructure, high energy cost, higher labour cost, cumbersome customs processes, and low level of environmental compliance.

The garment sector of Kenya is principally driven by exports to the United States of America (USA) under the AGOA initiative. Through AGOA, Kenya's apparel exports to the USA increased to USD 410 million in 2021, employing over 57,500 workers in Export processing zones (EPZ) alone. As indicated in Figure 1, Kenyan T&A exports have shown marginal increase over the past few years (2017-2021) with the decrease in export in 2020 being attributed to the COVID-19 pandemic.

2.2.1 Cotton sector in Kenya

In Kenya, cotton is grown solely by small-scale farmers in the former Western, Nyanza, Central, Rift Valley, Eastern and Coast Provinces of Kenya. It is mainly grown in arid and semi-arid areas where there are limited economic activities. Organic cotton is available in Kenya and the East African region but is mainly exported to other regions as it requires further processing due to its low quality.[26] The cotton lint yield in Kenya is low (550kg/ha) and the production cannot satisfy the local industrial needs. With the decreased local production, 93% of cotton is therefore imported to meet the Kenyan industry's required quality and quantity.[27] Kenyan firms import cotton from China, Pakistan, India, and neighbouring cotton-producing countries such as Uganda and Tanzania (Figure 2).

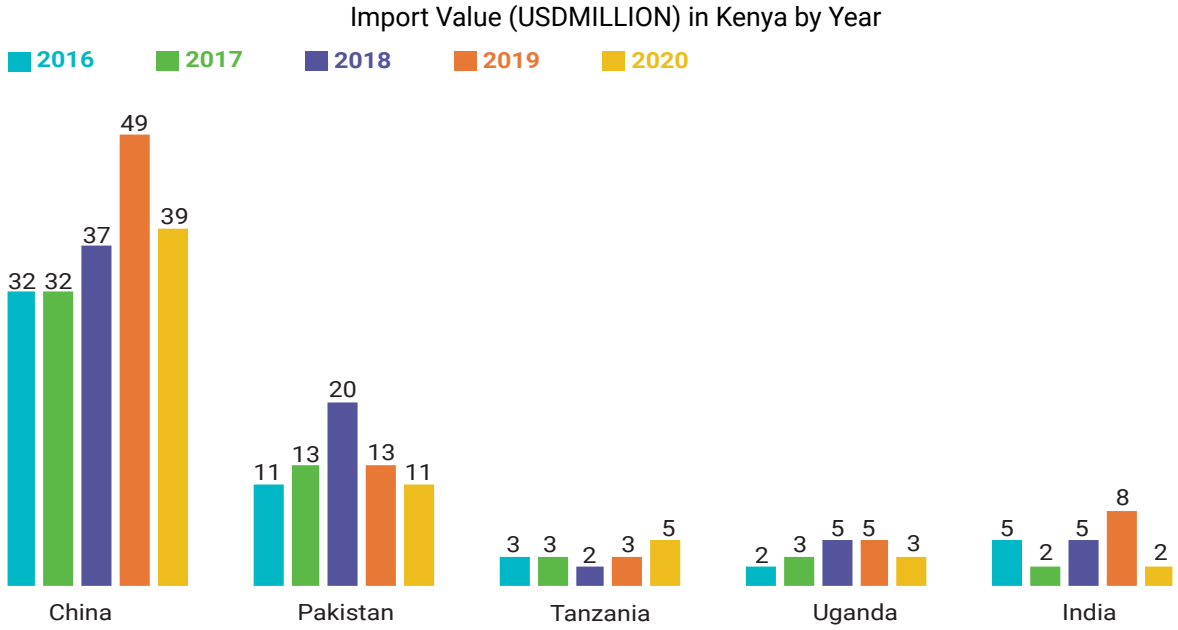

Figure 2: Kenya Cotton fiber import

Source: ITC, 2022

[24] Government of Kenya (2018). Kenya Vision 2030. Available at: https://vision2030.go.ke/wp-content/uploads/2018/09/Kenya-Vision-2030-Sector-Progress-Project-Updates-June-2018.pdf

[25] Achim Berg, Saskia Hedrich & Bill Russo, (2015). East Africa: The next hub for apparel sourcing; Available at: https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/East%20Africa%20The%20next%20hub%20for%20apparel%20sourcing/East%20Africa%20The%20next%20hub%20for%20apparel%20sourcing.pdf

[26] Kenya Investment Authority (2016). Strategic Plan (2018-2022); Promoting Investments in Kenya. Available at: https://invest.go.ke/wp-content/uploads/2016/10/KENINVEST-STRATEGIC-PLAN-2018-2022.pdf

[27] Government of Kenya (n.d). Kenya Apparel and Textile Industry; Diagnosis, Strategy and Action Plan. Accessed on July 16, 2022. https://openknowledge.worldbank.org/bitstream/handle/10986/22782/Kenya0apparel00tegy0and0action0plan.pdf?sequence=5

The cotton industry is faced by challenges that range from poor infrastructure making accessibility of farms and raw materials difficult; lack of support services, for example financial and agricultural services for cotton farmers; and slow-down of regulation and monitoring by relevant bodies such as the Cotton Board of Kenya, thus leading to contamination of cotton seeds, decrease of cotton lint quality and rise of unfairly competing cotton markets among other challenges. Apart from cotton fibre, the cotton value chain uses synthetic fibres for manufacture of cotton blended materials, like polyester cotton. Cotton processing factories also manufacture polyester viscose fabrics. The Kenya manufacturers of polyester and nylon fibres in Thika closed shop in the 1990s. Currently Kenya imports all its need for synthetic fibres, which is used for the manufacture of sweaters, blankets and blending with cotton to produce cotton blended yarns (Figure 3).

All the cotton, either grown locally or imported and the imported synthetic fibres are processed to produce yarn, fabric and garments. In Kenya, fully integrated factories have fibres as the main raw material and carry out spinning, weaving or knitting and finally dyeing and printing. Lately some of the factories have added garment making to add value to the fabrics they produce.

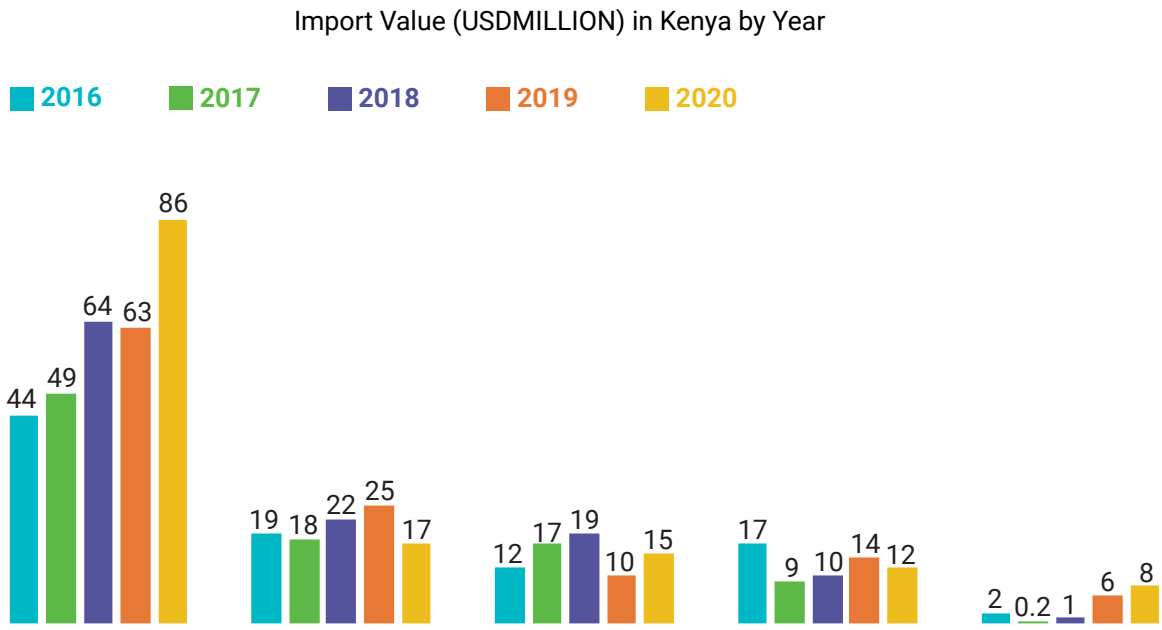

Figure 3: Kenya imports of Man-made staple

Source: computed from data obtained from www.trademap.org/

The cotton value chain also has companies that import yarn and use it for weaving or knitting. Others especially in the EPZ, buy fabric and produce garments. There are a growing number of cottage industry players,[28] who either hand spin cotton or buy spun yarn and then use hand weaving to produce niche products for export. While the numbers of the cottage industry are still small, the potential of creating green jobs in the cotton cottage industry is enormous.

[28] The cottage industries are made up of groups of spinners or weavers, who get fibre from a common unit, spin and weave the material and sell the product to supplier of the fibre, who undertakes packaging and marketing of the final product like basket, shawl, kikoy etc.

2.2.2 Sericulture in Kenya

The introduction of sericulture in Kenya was a joint venture of the Overseas Technical Co-operation Agency (OTCA) experts from Japan and the Ministry of Agriculture of Kenya in 1974.[29] There are four kinds of silk that are commercially known and produced: The Mulberry, Eri, Muga and Tasar silk. In Kenya two types are prevalent- the Mulberry and Eri silk which are produced from mulberry silkworms that feed on mulberry leaves and the eri silkworm that feed on castor oil plant leaves. These two types thrive well in Kenya due to the favourable climatic conditions. Despite sericulture being in Kenya for more than 45 years, its success has been hindered by the inadequate skills for production; lack of demand of silk finished products due to low knowledge of the products and their quality; and lack of well-defined government policies to co-ordinate the silk market in Kenya.

Being labour intensive, the silk production sector has the potential to provide employment and empowerment, especially among the women and youths, thus contributing to the national economy of Kenya. The key players in the sericulture industry in Kenya include the International Centre for Insect Physiology and Ecology (ICIPE) and the National Sericulture Research Centre in Thika. These two train farmers on silk rearing, provide farmers with silkworm eggs, and buy the cocoons from farmers and then export them. There are over 700 silk farmers, and they report better profits from sericulture as compared to other land uses. Other players in the sector also train farmers and provide them with eggs or worms and then buy the cocoons for hand spinning before either selling the yarn or hand weaving the yarn to produce niche products for exports. The emerging business model in the sericulture involves planting of mulberry or castor, worm rearing, post cocoon technology, hand spinning of yarn and hand weaving of silk yarn. Some of the producers prefer to export the silk yarn instead of weaving it. There are several clusters working on this kind of sericulture value chain, especially in Makueni, Kisumu and Trans Nzoia counties.

2.2.3 Sisal

Kenya produced 22,768 tons of sisal in 2020, making it the world's third largest producer after Brazil and Tanzania. In Kenya sisal is grown mainly as a plantation crop, with over 90% of the sisal exported earning Kenya USD 30 million. In Kenya, sisal is predominantly grown by ten sisal estates spread across the Coast, Eastern and Rift Valley regions of the country. Smallholder growers are spread all over the arid and semi-arid lands of the country, who grow the crop along the boundary, hedge rows and as conservation measure to prevent erosion, forming approximately 5% of the total sisal production. Much data on their production is not readily available as they produce individually and are spread all over, with only a few of them benefitting economically from sisal production. Those involved in production and processing of this value chain are mainly in Nyanza, Rift Valley, upper and lower Eastern and Coastal regions, utilizing most of their hedge row and boundary. 80% of the sisal fibre produced is exported mainly to Nigeria, Saudi Arabia, Ghana, EU and China. About 10% of the fibre is locally utilized in manufacture of cordage (ropes and twines), dartboard (for export market) and production of artefacts like traditional baskets (cyondos) by mainly women groups in the rural cottage industry and then mainly exported to Europe and USA markets. The value addition of sisal fibre is one of the potentials that could be tapped to generate green jobs.

2.2.4 Wool

In comparison to other livestock, sheep have received less attention in terms of research and development. Kenya has a good climate that favours the rearing of sheep for wool production. The main producing areas in Kenya include Nakuru, Elgeyo Marakwet, Uasin Gishu, and West Pokot counties. Other areas that bare this potential include the highlands such as the Mt. Kenya regions and Nyandarua in Aberdare Mountain ranges.[30] Back in 1990s over 80% of the wool produced in Kenya (Eldoret and Nairobi) was spun into yarn and suiting material for export. These factories closed down and all the wool produced in Kenya is now exported as fibre, without value addition, which has resulted in reduced fibre production. Furthermore, lack of policies to govern wool production, the increase of use of cheap synthetic fibres and the high competition that Kenya faces from leading wool producers globally, has exacerbated the situation. Besides this, the Kenya textile industry, universities, and research institutions dealing with wool and natural fibres are not members of the International Wool Textile Organization. It therefore becomes a challenge to certify Kenyan wool, negatively affecting trade.

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[29] Starovoytova, D. (2015). Mulberry and Silk Production in Kenya. Textile Science & Engineering. 5. 1-7.

[30] Memon, Hafeezullah & Wang, Hua. (2018). Determination and Characterization of the Wool Fibre Yield of Kenyan Sheep Breeds: An Economically Sustainable Practical Approach for Kenya. Fibres. 6. 55. 10.3390/fib6030055.

2.2.5 Garment Manufacture

The garment manufacturers can be classified into three types:

CLASSIFICATION OF GARMENTMANUFACTURERS

01. EPZ garment manufacturers

02. Medium and large garment manufacturers

03. Micro and small enterprises

Large scale operations, which are mainly Cut Make and Trim ("CMT") take place in huge factories and in Kenya, they dominate the Export Processing Zones where production is mainly done for export for retailing brands such as Calvin Klein and Tommy Hilfiger.

Small scale garment manufacturing operations include home-based or sole-proprietor tailors who serve the local communities and the cottage industries. Garment assemblers or factories producing small quantities of garments, but more than small scale operators can be termed as medium scale, for example Rivatex East African Limited, Thika Cloth Mills or Supra Mills (amongst others) which spin yarn, weave and assemble garments to meet the local demand. Most of the garment manufacturing is done in the EPZs, followed by the medium and large garment manufacturers, and the micro and small enterprises where the least garment production is done.

The Kenyan apparel manufacturing has several cottage industries that deal with silk, cotton, wool and sisal products. The cottage industries are made up of groups of spinners or weavers, who get fibre from a common unit, spin and weave the material and sell the product to the supplier of the fibre, who undertakes packaging and marketing. Such business models are practiced by Tosheka Textiles Limited (TTL) in Makueni, Punonta in Machakos and Allisam design in Kisumu. As most cottage industries are integrated into the surrounding communities as a means to empower them, these industries are the backbone to many rural economies. As the cottage industries do not need much investment to start, they have the ability to flourish and create green jobs.

2.2.6 Trade, Use and End of Life in the Kenya T&A sector

As shown in Figure 1, Kenya is a net importer of T&A goods. The key import partners are China, India, Pakistan, EU and Tanzania. China dominates the list with over 50% of all the T&A imports. The export market records over 70% of the exports going to the USA. Other key export partners include EU, Nigeria, Uganda and Rwanda. In view of its geographical location and presence of a number of T&A factories, that manufactures goods for the export market; Kenya is viewed as a developing hub for sourcing of T&A goods in Africa. Several brand-owners, like PVH, have established regional sourcing offices in Kenya while some buyers have pursued longer-term relationships with apparel producers, a sign that they plan to sustain networks with suppliers.

Another important import item in the Kenya T&A sector is the importation of second-hand clothes. Kenya imports an average of 120,000 tons of second-hand clothes per year (based on a five-year study from 2016 to 2020), worth over USD 30 million, and employs 2 million Kenyans, making it one of the main traders of second-hand clothes in Sub-Saharan Africa. It is worth noting that Kenyan imports keep on rising and in 2021, 185,000 tons of second-hand clothes were imported to Kenya. Most of these imports came from China (39%), Pakistan (12%), Canada (9%), US (7%), Poland (6%), and Germany (5%).[31] Reports indicate that Kenyans spend an average of 2.5% of their annual income on clothing, which is equivalent

[31] Manali B., Textile Value Chain, (May 26, 2021). Kenya's Import of Second-hand Clothing and Accessories between 2016-2020: An Overview of Mitumba Market in Kenya. Available at: https://textilevaluechain.in/in-depth-analysis/kenyas-import-of-seconhand-clothing-and-accessories-between-2016-2020-an-overview-of-mitumba-market-in-kenya/

to USD 2 billion per year.[32] On average over 75% of the clothing and footwear needs for the lower and middle-class Kenyans are met by second-hand goods. The end of life for second-hand clothes like all other textiles is not clear. The Kenyan Government has enacted the "the waste management Bill",[33] which will be used to formulate Extended Producer Responsibility (EPR). Since there are no major recycling or upcycling programs for Kenyan T&A sector and trash separation is not commonly practiced, it can be assumed that they are dumped into the landfills or burned. This is an environmental degradation hotspot, which needs to be investigated and addressed.

In Kenya, the sales of T&A products involve retailing shops and very little on-line business. There are many open-air markets, due to the Kenyan tropical weather. The use of T&A involves washing and ironing. Most of the washing is done manually, with very little machine washing being done. This may be due to the life standards of most of the Kenyans, where use of washing machines and the related running costs (electric cost is high) will be considered an extra cost. The general cleaning of textiles, in Kenya, involves releasing the effluent directly into the sewer lines or water bodies and there is no pre-treatment carried out to remove microplastics and other pollutants caused by detergents. Effluent released after washing of textiles in East African countries contains residues of phosphate detergents.[34] The textile sector is the 2nd highest contributor to plastic leakage in absolute value. Micro leakage of textile fibres from cloth washing and of micro beads from cosmetic products is also close in absolute value.[35] This is due to the absence of wastewater treatment that provides no barrier to the release of primary plastic micro-particles in waterways and oceans despite polyester being extensively used in textiles as the second polymer by absolute leakage.

[32] Inzillia S., Fie-Consult, (February 22, 2022). Unpacking the Tag of War between Second Hand Clothes and Local Textiles Sector in Kenya. Available at: https://fieconsult.com/unpacking-the-tag-of-war-between-second-hand-clothes-local-textile-sector-in-kenya/

[33] Government of Kenya (2021). The sustainable Waste management Bill, 2021. http://www.parliament.go.ke/sites/default/files/2022-05/The%20Sustainable%20Waste%20Management%20Bill%20%28%20National%20Assembly%20Bills%20No.%2022%29%202021.pdf

[34] Wandiga, S. & Madadi, V. (2009). Water Quality Issues in Eastern Africa. Handbook of Water Purity and Quality. 39-65. 10.1016/B978-0-12-374192-9.00003-0. Available at: http://erepository.uonbi.ac.ke/handle/11295/27380?show=full

[35] UNEP (2020). Kenya Final Report. National guidance for Plastic Pollution Hotspotting and Shaping Action – Life Cycle Initiative. Available at: https://plastichotspotting.lifecycleinitiative.org/wp-content/uploads/2020/12/kenya_final_report_2020.pdf

3. EVALUATION OF POTENTIAL MARKETS

3. Evaluation of Potential Markets

Kenya's T&A sector holds significant potential for economic growth and job creation. This evaluation aims to assess the potential markets for this sector, focusing on the Kenyan perspective. By analysing relevant sources (government reports, research institutions papers, and reports from international organizations) this evaluation provides a comprehensive understanding of the sector's potential. Kenya's T&A sector has shown considerable growth in recent years. With a strong presence of textile manufacturing units and a skilled workforce, the sector contributes significantly to the country's GDP and employment generation.[36] The sector has witnessed an increase in production capacity, exports, and domestic consumption. The World Trade Organization (WTO) for instance records that the T&A exports from Kenya have shown steady growth, primarily driven by the export of ready-made garments to international markets.[37]

a. Domestic Market

At the domestic level, there is a growing demand for T&A products. Kenya's growing population, expanding middle class, and increasing disposable income contribute to a robust domestic market for T&A. There is also a demand for fashionable clothing, traditional attire, and quality garments that present opportunities for local manufacturers and retailers. Further, Kenya's diverse cultural heritage provides a unique advantage in the domestic market. Traditional textiles, such as *kikoi, kanga,* and *Maasai shuka,* hold cultural significance and are in demand among the local population and tourists alike. Local manufacturers can capitalize on these cultural textiles to cater to the domestic market. The World Bank reports that the changing consumer preferences and a rising demand for fashionable and affordable clothing create a favourable environment for the sector to thrive in the domestic market.[38]

b. Regional Markets

The East African region presents promising opportunities for Kenya's T&A sector. Countries like Uganda, Tanzania, Rwanda, and Ethiopia have a growing consumer market and offer potential for trade partnerships and regional integration.[39] Trade agreements such as the East African Community (EAC) Common Market Protocol facilitate the movement of goods and services within the region, providing an advantage for Kenyan T&A exports.[40]

c. International Markets

Kenya's T&A products have a significant presence in international markets. The United States and Europe are major export destinations for Kenyan garments (World Trade Organization, 2022). The AGOA provides preferential access to the U.S. market, enabling Kenyan T&A manufacturers to compete on equal terms with other countries. Similarly, the Everything But Arms (EBA) initiative grants duty-free and quota-free access to the European Union market for products originating from Kenya.[41]

d. Challenges & Opportunities

The Kenya Association of Manufacturers in 2021[42] reported that the Kenya's T&A sector faces several challenges in accessing and expanding potential markets. These challenges include inadequate infrastructure, supply chain inefficiencies, high production costs, and stiff competition from other low-cost manufacturing countries. In the same year, the World Bank indicated that there were a number of opportunities that existed for market expansion through product diversification, embracing sustainability practices, and leveraging e-commerce platforms to reach a wider consumer base.[43]

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36 Kenya National Bureau of Statistics (2021). Economic survey 2021. Economic Survey 2021 - Kenya National Bureau of Statistics. https://www.knbs.or.ke/wp-content/uploads/2021/09/Economic-Survey-2021.pdf

37 World Bank. (2021). Kenya economic update: Securing the promise of economic diversification. Kenya Economic Update (KEU) (worldbank.org)

38 World Bank. (2021). Kenya economic update: Securing the promise of economic diversification. Kenya Economic Update (KEU) (worldbank.org)

39 United Nations Conference on Trade and Development. (2020). Economic development in Africa report 2020: Tackling illicit financial flows for sustainable development in Africa. Accessed at: https://unctad.org/system/files/official-document/aldcafrica2020_en.pdf

40 EAC (2022). Trade Agreements: The EAC Partner States have Signed the Following Trade Agreements. Accessed on June 4, 2022 from: https://www.eac.int/trade/international-trade/trade-agreements

41 European Commission. (2021). Everything but Arms (EBA) initiative. Available at: https://trade.ec.europa.eu/access-to-markets/en/content/everything-arms-eba

42 Kenya Association of Manufacturers. (2021). Kenyan manufacturing survey report 2021. Accessed at: https://assets.kpmg.com/content/dam/kpmg/ke/pdf/thought-leaderships/2021/Impact%20of%20COVID-19%20pandemic%20on%20manufacturing%20sector-One%20year%20on.pdf

43 World Bank. (2021). Kenya economic update: Securing the promise of economic diversification

3.1 Sector-level analysis

The evaluation of the potential markets for the Kenyan textile industrial sector was done according to the UNEP Eco-innovation manual.[44] Further reference was made to UNEP Eco-innovation textile supplement.[45] The assessment involved assembling basic information at three levels; sector level, market level and company level.

A point-based scoring method has been adapted to assess the first two levels, which was designed using the guidelines given in activity PR 1 (UNEP Eco-innovation manual). The results are summarized in this section. The company level assessment will be completed as part of the implementation work with the selected SMEs.

A1 - To what extent does the sector contribute to global greenhouse gas emissions and climate change?

- *Major contributor, 2 points*
- *Moderate contributor, 1 point*
- *Contribution is negligible, 0 points*

The climate impact of the global apparel industry is substantial, with over 3.3 billion metric tons of greenhouse gases (GHG) emitted across the value chain per year– roughly exceeding the direct emissions of all international flights and maritime shipping combined.[46]

The textile industry is termed as the third highest emitter of greenhouse gases (GHGs) globally, with the amount of GHG emitted by the sector estimated to represent between 2 to 8% of the world's emissions. Most of the climate impact comes from production of synthetic textiles, wet processing and the use phase. Decomposing and incinerated textile waste also release toxic greenhouse gases such as methane and carbon dioxide which contribute to climate change, as highlighted in Figure 4.

Over the last decade, Kenya's total GHG emissions increased by 23.66%, from 57.35 in 2009 to 81.01 million metric tons of carbon dioxide equivalent (MtCO2e) in 2019, totalling 0.18% of global GHG emissions.[47] The agriculture sector account for 62.8% of total emissions, followed by the energy sector (31.2%), industrial processes sector (4.6%), and waste sector (1.4%).[48] The contribution of the textile industry is regarded as one of the most significant within as result of used textiles imported from global north (see Figure 4) of which over 40% end up being dumped in the environment.[49]

[44] The manual can be downloaded from the following site: https://www.unep.org/resources/report/eco-i-manual-eco-innovation-implementation-process
[45] UNEP (2022), Eco-I manual Textile supplement. https://unep.ecoinnovation.org/wp-content/uploads/2022/02/Eco-innovation-Manual-Textiles-Supplement.pdf
[46] United Nations Environment Programme (UNEP, 2020). Sustainability and Circularity in The Textile Value Chain: Global Stocktaking. Available at: https://wedocs.unep.org/handle/20.500.11822/34184
[47] The World Bank (2023). Total Greenhouse Gas Emissions (kt of CO2 Equivalent – Kenya). Available at: https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?locations=KE
[48] Climate Links (April 30, 2017). Greenhouse Gas Emissions Factsheet: Kenya. Available at: https://www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-kenya
[49] Greenpeace (2022). Poisoned gifts – From donations to the dumpsite: textiles waste disguised as second-hand clothes exported to East Africa. (www.greenpeace.de) Available at: https://www.greenpeace.org/static/planet4-international-stateless/2022/04/9f50d3de-greenpeace-germany-poisoned-fast-fashion-briefing-factsheet-april-2022.pdf

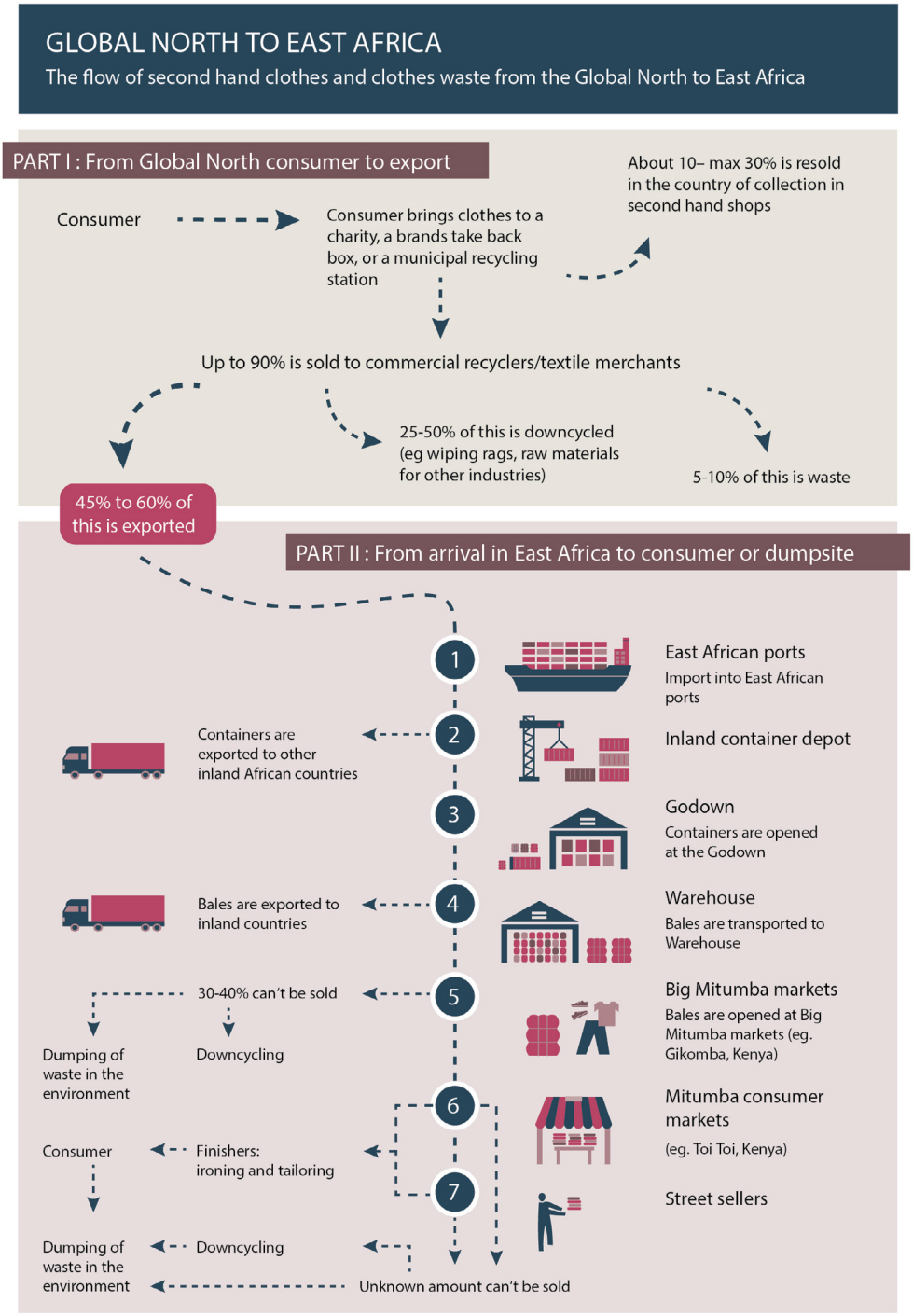

Figure 4: The flow of textile waste from global north to East Africa

(www.greenpeace.de)

Suggested score: 2 points, major contributor

A2 - To what extent does the sector contribute to global consumption of non-renewable resources and potable water?

- *Major contributor, 2 points*
- *Moderate contributor, 1 point*
- *Contribution is negligible, 0 points*

The current linear T&A system utilizes an estimated 98 million tonnes per year of non-renewable resources that include fertilizers for fibre crop production (e.g., the most utilized cotton fibre), petroleum for synthetic fibre production and chemicals used throughout the textile production process for example during finishing.[50] Most synthetic fibres are produced from crude oil, a non-renewable resource. Synthetic fibre production research indicates that synthetic fibre accounted for 64% of global textile fibre use in 2016. The production of plastic-based fibres for textiles uses around 350 million barrels of oil each year – which has more than doubled since 2000.[51] Production of synthetic fibre for the textile sector accounts for 15% of plastic production, which makes the sector the third largest user of plastic, behind packaging and construction.

The global apparel industry consumes approximately 215 trillion litres of water every year.[52] By comparison, the World Health Organization (WHO) estimates that 150 - 300 trillion litres are needed for the global population to meet most basic needs.[53] The textile industry impacts water scarcity during each life-cycle stage by polluting natural waterways through extensive use of chemicals, some of which cannot be removed by wastewater treatment plants.

Suggested score: 2 points, major contributor

A3 - To what extent does the sector contribute to global pollution problems?

- *Major contributor, 2 points*
- *Moderate contributor, 1 point*
- *Contribution is negligible, 0 points*

There are two potentially significant sources of pollution related to textiles: chemical release and micro-fibre release. Regarding chemical release, the textile industry is notorious for its impact on water systems.[54] However, in Kenya little data exists on the scale of water pollution from textile processing, due to a lack of systematic monitoring at mills and downstream.

More than 3,500 chemical substances are potentially used in the processing of textiles to provide specific properties amongst which 750 are classified as hazardous for human health and 440 as hazardous for the environment.[55] Chemicals of concern, relevant to the textile sector, include heavy metals, as well as chemicals used as dyes or solvents. For example, a family of substances called PFAS (per- and polyfluoroalkyl substances), commonly used in the textile industry for their water-, stain- and oil-repelling properties, are identified as a major issue of concern.[56] PFAS are linked to several severe health effects and are often referred to as "forever chemicals", as they do not break down easily and can accumulate in the environment.

Global cotton cultivation is estimated to require 4% and 16% of total global use of fertilizers and pesticides respectively, which represent substantial quantities of chemicals released directly into the environment. Regarding micro-fibre release, while the extent of global micro plastic pollution and its exact sources are not yet

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50 Ellen MacArthur Foundation (2017). A new textiles economy: Redesigning fashion's future. Available at: https://emf.thirdlight.com/file/24/uiwtaHvud8YIG_uiSTauTlJH74/A%20New%20Textiles%20Economy%3A%20Redesigning%20fashion%E2%80%99s%20future.pdf

51 Changing Markets Foundation (2022). A New Look for The Fashion Industry. Available at: http://changingmarkets.org/wp-content/uploads/2022/03/EPR_briefing_light_final.pdf

52 UNEP (November 12, 2020). COVID-19 is Forcing the Fashion World to Go Green. Available at: https://www.unep.org/news-and-stories/story/covid-19-forcing-fashion-world-go-green-says-rami-kadi#:~:text=The%20fashion%20industry%20consumes%20215,back%20better%20after%20the%20pandemic

53 UN (2022). The Human Right to Water and Sanitation. Accessed on June 12, 2022 from: https://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf

54 United Nations Environment Programme (UNEP, 2020). Sustainability and Circularity in The Textile Value Chain: Global Stocktaking. https://wedocs.unep.org/handle/20.500.11822/34184

55 OECD (2021), Policies to Reduce Microplastics Pollution in Water: Focus on Textiles and Tyres, OECD Publishing, Paris, https://doi.org/10.1787/7ec7e5ef-en. Retrieved from: https://www.oecd-ilibrary.org/sites/dbcbafc2-en/index.html?itemId=/content/component/dbcbafc2-en

56 Gaonkar, Omkar. (2021). An overview of toxic chemicals in textiles.

known, it is estimated that 0.5 million tons of microfibers are released into the ocean each year when washing synthetic textiles.[57] This accounts for 35% of primary micro plastics that are released into the environment.

Suggested score: 2 points, major contributor

A4 - How important is the sector for the national economy?

- *High importance, contributes over 15% of GDP or employs over 15% of workforce, 2 points*
- *Medium importance, contributes over 5% of GDP or employs over 5% of workforce, 1 point*
- *Low importance, contributes less than 5% of GDP and employs less than 5% of workforce, 0 points*

The textile industry is globally important, providing high levels of employment, foreign exchange revenue and products essential to human welfare. The global textiles market is estimated at around USD 1.4 trillion, with textiles worth about USD 7.7 billion traded in 2019.[58] The industry employs over 300 million people globally, especially in developing countries such as Bangladesh, India, Pakistan and Vietnam.

At the national level, the textiles sector in Kenya is rated as one of the key manufacturing industries.[59, 60] The textile sector contributes about 14 % of employment in Kenya owing to its capacity to create both direct and indirect employment opportunities.[61] In 2017 the sector employed over 2.5 million people, where 84% were employed in Micro SMEs while 8% were employed indirectly and over 1.6% consist of cotton farmers.[62] The total turnover of the sector is about USD 564 million. The contribution of the textile manufacturing sector to Kenya's GDP is expected to continue growing from 10% in 2019 to 15% by 2022.[63]

Suggested score: 2 points, high importance

A5 - To what extent has this sector been targeted by Non-Governmental Organizations (NGOs) to encourage improvements in sustainability performance?

- *Major focus of sustained, global campaigns by NGOs, 2 points*
- *Focus of occasional, local campaigns by NGOs, 1 point*
- *No focus/attention from NGOs, 0 points*

Activity PR.3 in the Eco-I manual and the Eco-I textiles supplement identifies several stakeholders, including a category for Civil Society / Advocacy / NGOs. Among the textiles-relevant organizations in this category are international NGOs, including Clean Clothes Campaign (CCC), Greenpeace, and People for the Ethical Treatment of Animals (PETA) that focus on workers' rights, environmental protection, and animal rights respectively. While CCC works exclusively on the textiles sector, Greenpeace, and PETA work within multiple sectors. A relatively new organization is Fashion Revolution, which campaigns for global brands to provide greater transparency into their supply chains. While these are examples of 'watchdog' NGOs, there are a number of NGOs working more collaboratively with commercial stakeholders, such as the World Wildlife Fund (WWF). There are also watchdog and collaborative NGOs that engage both globally and locally within the textile sector.

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57 European Parliament. (2021). Microplastics and nano plastics in the oceans and their effects on marine life, human health and ecosystems: State-of-the-art review (No. PE 658.701). Directorate-General for Parliamentary Research Services, European Parliament.

58 Ellen Macarthur Foundations (2023). Fashion and the circular economy deep dive. Accessed on 23 November 2023. https://www.ellenmacarthurfoundation.org/fashion-and-the-circular-economy-deep-dive

59 Government of Kenya (2012). Sessional Paper No.9 of 2012 on the National Industrialization Policy, Framework for Kenya 2012-2030. https://repository.kippra.or.ke/handle/123456789/1037

60 Government of Kenya (2018). Third medium Term plan 2018-2022, Transforming lives: Advancing socio-economic development through the big four. Available at: http://vision2030.go.ke/wp-content/uploads/2019/01/THIRD-MEDIUM-TERM-PLAN-2018-2022.pdf

61 CEIC (2022). Key Information about Kenya Employed Persons. Accessed on: May 22, 2022. www.ceicdata.com/en/indicator/kenya/employed-persons#

62 ISAAA Inc. (April 18, 2018). Kenyan Government Banks on Bt Cotton to Revive Textile Industry- Crop Biotech Update 2018. Available at: https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=16383

63 KAM (2018). Manufacturing in Kenya Under the 'Big 4 Agenda': A Sector Deep-dive Report. Available at: https://kam.co.ke/kam/wp-content/uploads/2018/10/KAM-Manufacturing-Deep-Dive-Report-2018.pdf

The Fair-Trade Organization of Kenya specifically empowers producers and promotes fair trade practices including better prices for goods, sustainable production methods and safe working conditions for workers. While KAM, is not exclusively an NGO, it carries out initiatives to improve energy efficiency, reduce waste and improve the general environmental performance, with regards to textiles. Other bodies in the forefront of promoting sustainability in the Kenyan textile industry include the Changing Markets Foundation and their 'Trashion' campaign on used textiles traded to Kenya; Greenpeace's 'Poisoned Gifts' campaign on used textile trade in Kenya and Tanzania; Sustainable Fashion Kenya that advocates for sustainable fibre cultivation; and the Better Cotton Initiative (BCI) Kenya that promotes sustainable cotton production practices, to ensure that the social and environmental aspect are considered.

While NGO campaign activity in the sector may not be of the 'sustained, global' nature attributed to 'a major focus' the activity can be judged as being closest to this level. There has also been an increase in NGO attention from workers' rights advocates due to the challenges faced by textile supply chains during the COVID-19 pandemic.

Suggested score: 2 points, *Major focus of sustained, global campaigns by NGOs*

3.2 Market-level analysis

This section summarizes the T&A market in Kenya against the global market. A point-based scoring method is adapted to assess the market using the guidelines given in PR 1 (UNEP Eco-innovation manual).

B1 - How strong is the growth of this market?

- *Strong (>5% per year), 2 points*
- *Moderate (2-5% per year), 1 point*
- *Weak (<2% per year), 0 points*

A drastic decline in the growth of Kenya's textile market was experienced in the late 1980's. However, the introduction of the AGOA[64] in 2000, gave the Kenya T&A sector a new lease of life. This worked synergistically with the introduction of Export Processing Zones (EPZ)[65] in Kenya a decade earlier, and the apparel sector recorded tremendous growth, from USD 8.5 million in 2000 to USD 406 million in 2020. According to the data based on Trade statistics for international business development product codes 8445 and 61 respectively[66] in Table 4 (Product Code 8445: Machines for preparing textile fibres, spinning, doubling, or twisting machines and other machinery) and Figure 5, Kenya T&A exports have shown marginal growth over the past few years (2014-2021) with the decrease in export in 2020 being attributed to the COVID-19 pandemic which created various problems across many markets. The growth of the second-hand market has also grown rapidly, and is expected to experience accelerated growth, with the traditional thrift and donation, characterized by second-hand shops often run by charity organizations, being replaced by e-commerce platforms for second-hand merchandise.[67]

The growth of the Textile Industry in Kenya has also been accelerated by the government support through policy making and implementation of development strategies. The government put in place a strategy to promote development under the Big Four Agenda[68] where textile and leather sectors are regarded as key manufacturing pillars. Kenya Industrial Estates (KIE) is also a government agency created to offer incubation, accelerator and business advisory services, financing and development of industrial parks. KIE has identified T&A value chains as one of the key sectors of focus going forward. As of 2019, KIE had hosted several incubators and financed over 66 T&A SMEs. SMEs are critical to the Kenyan economy as they constitute about 80% of Kenyan businesses and employ around 78% of the labour force (about 14.9 million). Currently, an approximated 7.4 million SMEs in Kenya collectively contribute about a third of the country's GDP.

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64 AGOA. (2021). Retrieved from African Growth and Opportunity Act: https://agoa.info/profiles/kenya.html
65 Government of Kenya (2015) Retrieved from: Export Processing Zone Act. http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/ExportProcessingZonesAct_Cap517.pdf
66 ITC (2023). Analysed from Trade statistics for international business development. Accessed on January 3, 2023 from https://www.trademap.org/Index.aspx
67 Testa, F., Gusmerotti, N.M., Batelli, M. & Limone, S. (2022). Consumer Behaviour relating to Circular fashion, Innovation and Usage of QR code. 10.13140/RG.2.2.25644.33928.
68 Government of Kenya (2018). Third medium Term plan 2018-2022, Transforming lives: Advancing socio-economic development through the big four. Available at: http://vision2030.go.ke/wp-content/uploads/2019/01/THIRD-MEDIUM-TERM-PLAN-2018-2022.pdf

Table 4: List of Textile Technology Supplying Markets to Kenya in thousands of US Dollars

Exporters / Year	2014	2015	2016	2017	2018	2019	2020	2021
World	503	6,641	1,112	1,081	11,925	2,860	2,164	1,011
India	150	251	17	351	11,463	472	287	159
EU	82	1,916	246	549	205	1,624	1,593	87
China	258	269	848	172	191	408	243	168
Slovenia	-	4,109	-	-	-	-	-	-
Africa	-	-	-	-	-	-	34	563
Japan	-	-	-	-	-	349	-	-
Malaysia	-	95	-	-	--	-	-	-
Brazil	-	-	-	-	-	-	-	35
USA	-	-	-	10	-	-	-	-

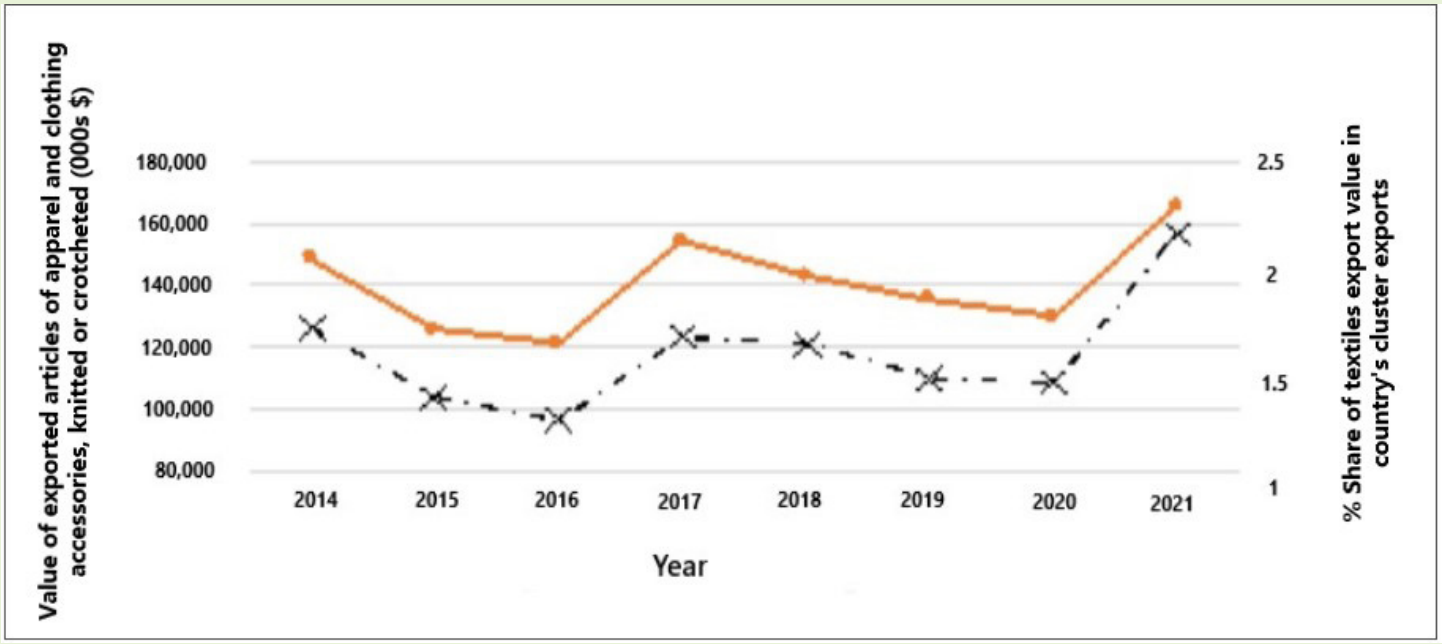

Figure 5: Textile products exported by Kenya in absolute value (thousands of US Dollars - dashed line) and % share of value in country's cluster exports (continuous line).

(*Source: Authors elucidation based on data from* trademap.org)

Suggested score: 1 point *Moderate growth (gradual recovery of textile sales after COVID-19 pandemic)*

B2 - How strong is the competition in this market?

- *Strong (6+ companies competing), 2 points*
- *Moderate (2-5 companies competing), 1 point*
- *Monopoly (1 company), 0 points*

Globally, the B2C apparel market is crowded, with many established brands and very low barriers to entry for new brands. Compared to companies operating in the second-hand market - including collection, sorting, and resale services, - competition is lower. However, new actors and established retailers are increasing in this market. In Kenya, stiff competition exists among the EPZ based garment manufacturers (cut and make) for both the EU and USA markets. On the other hand, there is also stiff competition among fabric manufacturers especially for the locally/regionally produced but usually scarce raw cotton. Local companies are also competing for the supply of the Kenyan government T&A products which include Police uniforms and uniforms for other armed forces like Kenya Army and Navy.[69]

Suggested score: 2 points. *With the scoring metric above, the B2C apparel industry would be categorized as Strong.*

B3 - To what extent is government policy encouraging and supporting moves towards improved sustainability performance?

- *Major support from policy, including financial measures, 2 points*
- *Moderate support from policy, but no financial measures, 1 point*
- *No support from policy, 0 points*

The European Union's (EU's) circular economy action plan (CEAP), adopted in March 2020, is one of the main building blocks of the European Green Deal and specifies textiles as a prioritized "key product value chain".[70] This is relevant to Kenya if it wants to increase its export of textiles to the EU. Policies for sustainable textiles are gaining traction across regions. Governments have actively supported sustainability in the sector through funding to relevant initiatives, including through UN agencies.[71] The OECD Due Diligence Guidance[72] also provides recommendations on responsible supply chains in the garment and footwear sector.

[69] From focused discussion with state Department trade and enterprise development
[70] European Union (2020). The EU's Circular Economy Action Plan. Retrieved from: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en
[71] See for instance the United Nations Alliance for Sustainable Fashion) and other international organizations; https://unfashionalliance.org/
[72] OECD (2018), OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector, OECD Publishing, Paris, https://doi.org/10.1787/9789264290587-en

The following government policies specifically encourage and support sustainability of textiles in Kenya:

01. **Kenya Apparel and Textile Industry – Diagnosis, Strategy and Action,**[73] which amongst others, recommends that Kenya should develop a brand of innovation and green production through green certification to ensure external credibility.
02. **Kenya's Textile and clothing value chain roadmap (2016-2020).**[74] The roadmap provides, amongst others, strengthening of the sector coordination to support skills development; improve compliance to increase productivity and competitiveness and improve the legal and regulatory framework relevant to the sector.
03. **Kenya's Green economy strategy and implementation plan (2016-2030).**[75] One of the pillars of the strategy is sustainable natural resource management which entails addressing the drivers of natural resource change and providing support for green and eco-friendly technologies and related research and innovation activities.
04. Kenya is also actively involved in the **Marrakech Process on SCP, the African 10 Year Framework of Programs on SCP** and the African Roundtable on SCP,[76] as well as the Global Alliance for Circular Economy and Resource Efficiency (GACERE).

Kenya also promoted a lifecycle approach to textile SME business through the textile and clothing value chain roadmap and a detailed 5-year action plan (Textile and Clothing Value Chain Roadmap for 2016-2020). This road map was crafted through extensive public-private stakeholder consultations and the technical support from the ITC.[77] The first objective was to maximize productivity and uphold quality requirements through skills development. The second objective focused on improving the business environment to further support the development of the T&A industry. The third objective aimed to expand the benefits of investment throughout the T&A value chain. Lastly, the fourth objective was to enable market access for Kenyan T&A products. The Plan of Action outlined specific actions and strategies to achieve the strategic objectives of the Textile and Clothing Value Chain Roadmap. These actions included establishing industry-specific training programs and skills development initiatives, addressing policy and regulatory barriers, promoting investment in the sector, and implementing trade facilitation measures. The goal was to enhance productivity, improve the business environment, distribute the benefits of investment, and facilitate market access for Kenyan T&A products. While the plans were well received by the government, the implementation lagged behind due to lack of direct Government financial support to the various state departments that needed to implement the proposal. Further financial constraints brought about by COVID-19 pandemic relegated the issues to the level of importance but to be implemented when finances are available.

Suggested score: 1 point. *On an international and local (Kenya) level, the support could be deemed as moderate, as government policy examples are currently mostly in the proposal stage.*

B4 - Is this market affected by new or forthcoming legislation?

- *Major changes required to meet new or forthcoming legislative requirements, 2 points*
- *Moderate changes required to meet new or forthcoming legislative requirements, 1 point*
- *No new or forthcoming legislation, 0 points*

The Kenyan Government has launched the fourth medium term plan (4MTP) 2023-2027 of the vision 2030, which incorporated the "BIG 4" agenda. The main objective of the 4MTP is to uplift the living standards of Kenyans (especially those living below the poverty levels) by creation of employment and fostering economic growth.

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73 World Bank Group Global Development Solutions (2015). Kenya Apparel and Textile Industry: Diagnosis, Strategy and Action Plan. © World Bank, Washington, DC. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/441761468000939834/kenya-apparel-and-textile-industry-diagnosis-strategy-and-action-plan

74 ITC (2022). Kenya Textiles and Clothing Value Chain Road Map. Accessed on January 14, 2022 from https://intracen.org/file/kenya-valuechainroadmap9webpdf

75 United Nations Environment Programme, & Kenya, Ministry of Environment and Natural Resources (2016). Green Economy Strategy and Implementation Plan 2016 – 2030: A low carbon, resource efficient, equitable and inclusive socio-economic transformation. https://wedocs.unep.org/20.500.11822/33042

76 UNEP & UNDESA – United Nations Department of Economic and Social Affairs (2010). Paving the Way to Sustainable Consumption and Production. Available at: https://sustainabledevelopment.un.org/content/documents/462csd18_2010_bp4.pdf

77 International Trade Center (ITC) (2022). Kenya Textiles and Clothing Value Chain Road Map. Accessed on January 14, 2022 from https://intracen.org/file/kenya-valuechainroadmap-9webpdf

Key among the pillars includes the Micro Small and Medium Enterprise Economy, leather and textile sectors.[78] The plan proposed development of Special Economic Zones and Industrial Parks as well as promotion of cottage industries to support growth of the manufacturing sector and in turn economic growth of the country.

Suggested score: 1 point moderate

B5 - How interested are the end customers of this market in improved sustainability performance?

- *Major interest – willing to switch products/suppliers or pay a price premium for better sustainability performance, 2 points*
- *Moderate interest – information about sustainability performance is considered a part of the purchase decision, but not a deciding factor, 1 point*
- *No interest, 0 points*

Apparel holds importance in both cultural and individual identity, meaning customers' interests can incorporate more emotional and less rational weight than for other goods. Many international surveys and research reports on apparel consumers' attitudes show increasing awareness and interest in sustainable fashion, especially amongst trend-driven younger generations,[79] although this trend certainly varies across and within markets. Online searches for sustainable fashion have increased by 66% since 2018, with a 187% increase in page views for sustainable denim brands.[80] Consumers fall into three scoring groups: major, moderate and no interest. Overall, the level of interest could be rated as moderate, and on a path to becoming major.

Suggested score: 1 point, moderate

B6 - Are there trends that would encourage eco-innovation in this market?

- *Yes, several strong trends that would encourage eco-innovation, 2 points*
- *Possibly, one or two weak trends that would encourage eco-innovation, 1 point*
- *No relevant trends, 0 points*

The macro-environmental analysis in PR.5 identifies a handful of trends and developments that could encourage eco-innovation in Kenya (compared to Asia), either through emerging requirements or opportunities 'pushing' innovation for new solutions, or as new developments serving to enable eco-innovation (Figure 6). Among these are growing customer interest and demands for transparency, and digital tagging technology that allows greater transparency. Influential stakeholders in the textiles value chain are also making visible endorsements and commitments toward ambitious sustainability goals, for example the United Nations Framework Convention on Climate Change (UNFCCC) Fashion Industry Charter for Climate Action (2021), the Fashion Pact (2021) and the Circular Fashion System Commitment (Global Fashion Agenda, 2020).[81] Actions to fulfil such commitments would typically reverberate through those companies' value chains.

Suggested score: 1 point

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78 Government of Kenya (2022). Fourth Medium Plan 2023-2027. https://www.planning.go.ke/wp-content/uploads/2022/02/Final-MTP-2023-2027-Concept-Note-1-Final.pdf

79 McKinsey (2020). The Next Normal-The Future of Business: Reimagining 2020 and Beyond. Retrieved from:https://www.mckinsey.com/featured-insights/the-next-normal/business-in-2020-and-beyond

80 LYSTInsights (2019). Searching for Sustainability 2019.Retrieved from: https://www.lyst.com/data/sustainable-ethical-fashion/

81 Global Fashion Agenda (2021). The Fashion CEO Agenda 2021. Retrieved from: https://www.globalfashionagenda.com/publications-and-policy/fashion-ceo-agenda-2021/

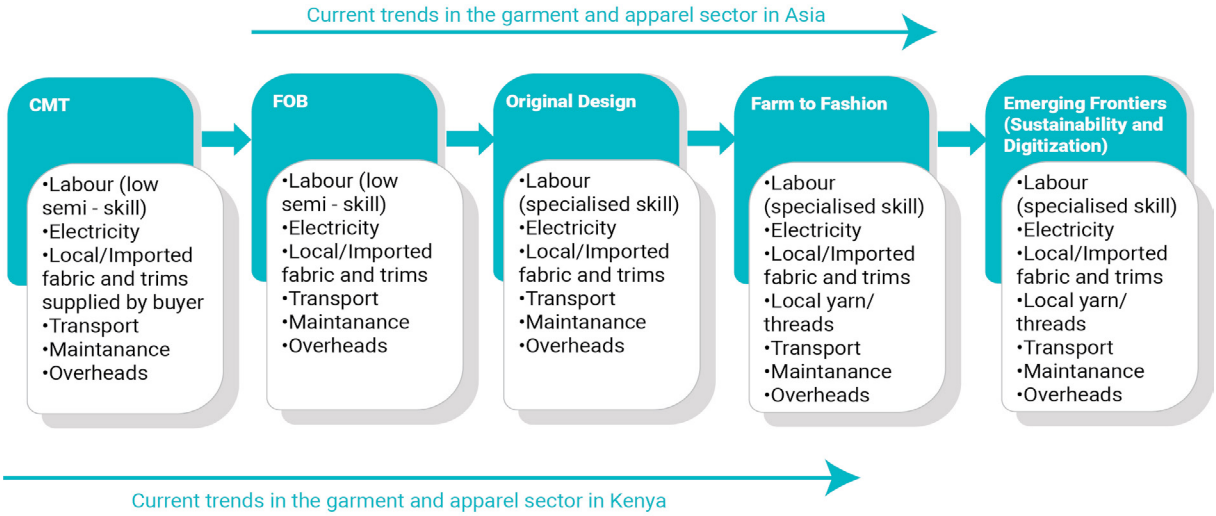


Figure 6: Trends in the garment and apparel sector in Kenya

(Source: Authors elucidation)

B7. Do you have existing customers, reputation, and credibility in this market?

- *Yes, significant number of existing customers and well known in this market. (2 points)*
- *Yes, some existing customers but not well known in this market. [1 point]*
- *No customers or reputation in this market. [0 points]*

The T&A market is very dynamic and sensitive to emerging trends. The diversity of market actors and stiff competition necessitates stringent efforts towards brand enhancement, new customer acquisition, retention of existing customers and to remain above the competition. Moi University has worked with other stakeholders to support the T&A sector in Kenya. In 2016, Moi University was one of the contributors to the T&C value chain roadmap.[82] Moi University is also represented in several Technical Committees at Kenya Bureau of Standards, East African Community secretariat and African Organization for standardization (ARSO), where regional and continental standards are made. Moi University hosts the African Centre for Phytochemicals, Textiles and Renewable Energy (ACE II-PTRE).[83] Therefore Moi University is at the forefront to carry out research and influence policy of the T&A sector in Kenya and Africa at large.

Furthermore, Moi University has a working relationship with senior government officials in the state Department of Trade, which has provided the chairman of the National Steering Committee (SC) of the InTex project in Kenya. The chairman of SC (Dr Simiyu) is the Director of Research and Policy analysis. Moi University also enjoys a cordial relationship with Ms. Noreen Nthiga, the Director of Operations at the SMEs advisory Unit in the Executive Office of the President, who is also a member of SC. Other companies that work closely with Moi University in the area of Textile and Fashion includes; National Environmental Management Authority (NEMA), Kenya Bureau of Standards (KEBS), African Organization for standardizations (ARSO) and MAS intimate EPZ Ltd, whose General Manager visited Moi University in the month of February 2023 and expressed interest to work with Moi University.

82 International Trade Center (2016). Kenya Textile and Clothing value chain roadmap. https://intracen.org/file/kenya-valuechainroadmap9webpdf
83 African Center for Phytochemicals, Textiles and Renewable Energy (2018). Available at:https://excellencecenter.mu.ac.ke/

Suggested score: *Yes, significant number of existing customers and well known in this market (2 points)*

B8. Are the potential companies in this market similar to the types of organization that we normally choose to work with? Would they make good companies for our organization?

- *Yes, exactly the type of company that we aim to work with. [2 points]*
- *Possibly, some similarities but some differences. [1 point]*
- *No, not the type of company that we aim to work with. [0 points]*

The T&A sector is a priority sector by the Kenyan Government due to its unique characteristics of being labour intensive and complex value that covers fibre growing, processing, and fashion design and marketing. The Department of Textile Engineering was the first-degree level Department that was set up in Kenya to contribute to the growth of the sector. The Department has worked with several stakeholders which includes; cotton farmers (advising on the crop husbandry and harvesting methods), hand weavers using sisal fibres to make baskets, textile hand loom artisans (use of natural dyes) and several government and non-governmental lead special task committees (for example; committee for design of curriculum for textile and apparel artisans, committee for design of road map for the textile and apparel roadmap). The Department has also played an important role in advising SMEs with respect to use of standards in yarn, fabric and garment manufacture at National (Kenya), regional (East African Community) and Continental (Africa). Moi University has a long history of working with stakeholders in the Kenya T&A sector and would therefore work with any potential company that would be interested in sustainability and circularity in the Textile and apparel industry.

Suggested score: 2 point

B9. Do we have the necessary sector and market knowledge within our organization today to deliver eco-innovation services to this market?

- *Yes, we have several staff with relevant sector and market knowledge [2 points]*
- *Possibly, we have one staff with some relevant sector and market knowledge. [1 point]*
- *No relevant sector or market knowledge. [0 points]*

Moi University has carried out research and training in the T&A sector in areas such as: large scale testing of use of natural dyes in the textile industrial, training of SMEs in Kenya and Uganda on use of natural dyes, research on use of sisal (in collaboration with National Textile University (Pakistan)), re-cycling of post-industrial waste (in collaboration with Rivatex, Stockholm environmental Institute (SEI) and Estonia Academy of Arts (EKA)) and use of enzymes in the textile industry. These research projects have contributed to provision of eco-innovation services to the sector.

Suggested score: *Yes, we have several staff with relevant sector and market knowledge (2 points)*

B10. How easy would it be to collaborate with other organizations within this market based on geographic locations?

- *Relatively easy – majority of market, including final customer, is within the same country [2 points]*
- *Somewhat difficult – significant proportion of market or final customer is in a different country [1 point]*
- *Very difficult – majority of market, including final customer, is in a different country [0 points]*

The Kenyan T&A sector is at a cross – road, where the local textile needs are not met, there are potential markets which could be exploited, yet it has local problems, which include high cost of energy, lower and labour productivity, which slows down its growth. The T&A goods imported into Kenya are made in other countries like China, India and Pakistan, where the manufacturing environment is different.

Suggested score: *Somewhat difficult – significant proportion of market or final customer is in a different country (1 point)*

4. BUILDING THE RIGHT EXTERNAL PARTNERSHIP

4. Building the Right External Partnership

According to the Eco-innovation manual, the first step in building the right partnership is to identify life cycle activities, which include fibre production, yarn and fabric production, textile production, consumption/use, and end-of-life. These activities are depicted in Figure 7, which involve other sub activities that further define the value chain.

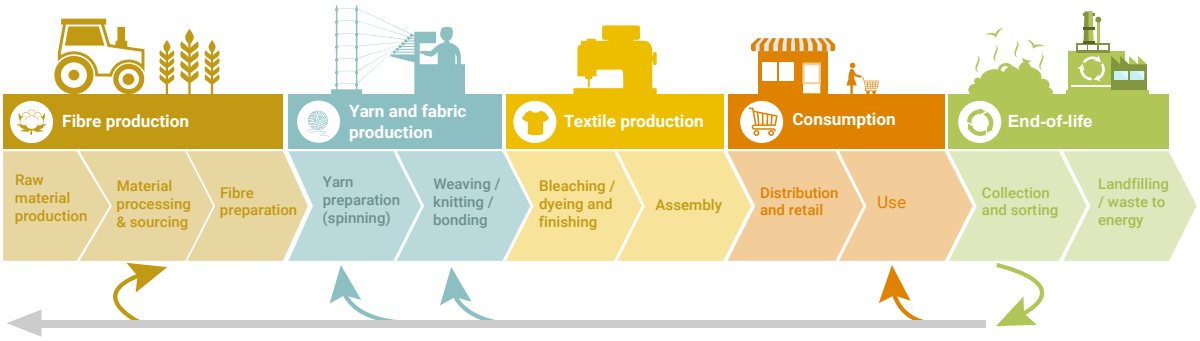
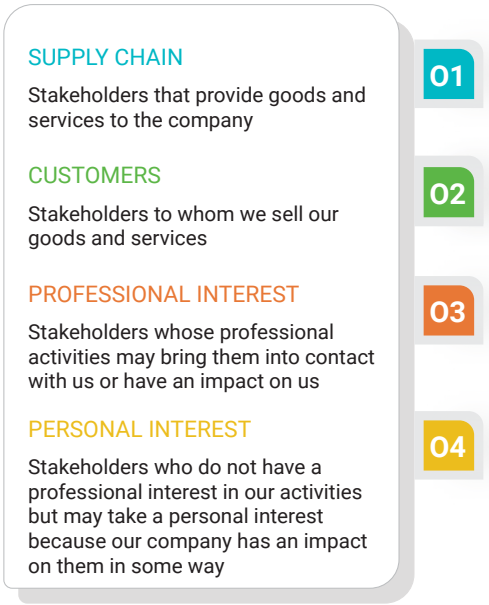


Figure 7: Linear textiles value chain
(Source: UNEP, 2020)

The Eco-innovation manual has proposed a life cycle stakeholders' template, which lists four key factors to be considered.



The contributions of the different actors to the Kenyan T&A value chain are shown in Figure 7 and Figure 8. Key issues to be addressed include the presence of middlemen in the supply chain. Several stakeholders can be identified across the T&A value chain, with every stakeholder playing an important role in ensuring that projects are delivered successfully and/or that sustainability is achieved in this sector. It is therefore important that key stakeholders are identified, and their roles clearly established prior to the implementation of Eco-Innovation in Kenya. The key stakeholders (Table 5) in the Kenyan textile value chain can be categorized as the government, the private sector, other industry associations and unions, financial institutions and other civil society, and skill development organizations. Table 6 gives identified SMEs and the different government departments linked to them. The InTex project hopes to work together with the government departments and the SMEs to contribute to a paradigm shift where production and consumption in the T&A sector is sustainable.

Table 5 :Enabling enviroment stakeholders in the Kenyan T&A sector

A. Government and other public institutions

SN	ORGANIZATION/ MINISTRY	MANDATE/ RELEVANT DEPARTMENTS AGENCIES	POTENTIAL ROLE(S) RELEVANT TO IMPLEMENTATION OF ECO-INNOVATION
GOVERNMENT			
1.	The National Treasury and Economic Planning https://www.treasury.go.ke/ • State Department of Finance • State Department of Economic Planning	The mandate of the National Treasury is to formulate, implement, monitor, and evaluate economic policies, plans and strategies towards achieving the national agenda. The key agencies include: • Kenya Revenue Authority https://kra.go.ke/ • Central Bank of Kenya https://www.centralbank.go.ke/	Financing development projects through loans and offering training through banks such as Kenya Cooperative Bank (KCB) and Equity Bank.
2.	Education https://education.go.ke/ • State Department for Basic Education • State Department of Technical Vocational Education and Training • State Department for Higher Education and Research	The mandate of the ministry includes providing, promoting and coordinating, quality education, training and research for sustainable development The key agencies include: • Higher Education Loans Board https://www.helb.co.ke/ • Technical and Vocational Education and Training Authority • Universities e.g., Moi University, The Technical University of Kenya, Jomo Kenyatta University of Agriculture and Technology (JKUAT) and Kenyatta University • National Research Fund https://researchfund.go.ke/	Assist to equip people with relevant skills and knowledge to drive sustainability in the textile industry. This can be done by implementation of education and training policies, standards, curricula, examinations and granting charter to institutions. Offer opportunities to further careers in the country and foreign advanced states to build the capacity of the textile workforce in Eco-Innovation and sustainability. Offering financial support for education and research work to promote Eco-Innovation.

A. Government and other public institutions

SN	ORGANIZATION/ MINISTRY	MANDATE/ RELEVANT DEPARTMENTS AGENCIES	POTENTIAL ROLE(S) RELEVANT TO IMPLEMENTATION OF ECO-INNOVATION
3.	Roads, Transport and Public Works https://transport.go.ke/ • State Department of Roads • State Department for Transport • State Department for Public Works	The mandate of the ministry is to provide efficient and reliable transport services for sustainable economic growth The key agencies include: • Kenya Airports Authority https://www.kaa.go.ke/ • Kenya Ports Authority https://kpa.co.ke/ • Kenya Railways Authority https://krc.co.ke/ • National Transport and Safety Authority https://ntsa.go.ke/	To provide more efficient, affordable, and reliable logistic services. This will ensure that trade is more efficient and sustainable, especially with the fact that many textile firms import raw materials for production, and export finished goods for sale through road, rail, ports and air
4.	Environment and Forestry https://www.environment.go.ke/ • State Department of Environment and Forestry	The mandate of the ministry includes providing and facilitating good governance in protection, restoration and management of environment and forestry for sustainable development The key agencies include: • National Environment Management Authority https://www.nema.go.ke/ • National Environment Trust Fund (NETFUND) https://www.netfund.go.ke/	Potential roles: Coordinating environmental management activities in partnership with textile industries and other relevant institutions, to educate the public on matters such as rational utilization of raw materials, waste management, healthy consumerism, and Eco-Innovation. Establishing laws and regulations to promote Eco-Innovation in Kenya such as on textile waste disposal and sustainable industrial processes to prevent solid waste and air pollution respectively. Undertaking and coordinating research to drive project aiming at sustainability in the textile industry.

B. Non-Governmental Companies

SN	SECTOR	AGENCIES	ROLE(S)
PRIVATE SECTOR			
1.	Retailers	Brands such as Calvin Klein, Walmart, and Tommy Hilfiger	International retailers and brands play an important role in the industry by purchasing finished goods from manufacturing industries, where most are based at the EPZs in Kenya. As clients, brands and retailers can mandate that sustainable and eco-innovative processes are adhered to throughout their supply chain.
2.	Independent Power Producers (IPPs) Renewable Energy Producers	Tsavo Power Company Ltd https://yellow.co.ke/tsavo-power-co-ltd/blogs/tsavo-power-co-ltd-sustained-power-generation-operations Iberafrica Power Ltd https://iberafrica.co.ke/ Rabai Power Ltd https://rabaipower.com/ Power Gen Renewable Energy Illumina (Solar Energy) https://www.illumina.com/	An IPP is an electrical energy producer that is not a public utility, but which makes electricity available for sale to utilities or the general public. IPPs and renewable energy producers supplement electricity providers. Use of renewable and cleaner energy in the textile industry would save on costs of electricity and reduce air pollution.
INDUSTRY SECTOR ASSOCIATIONS/UNIONS			
1.		KEPSA https://kepsa.or.ke	Advocates for private businesses and ensures improvement of overall business environment of Kenya by working together with the government and other stakeholders.
2.		SMEs Founders Association https://smefoundersassociation.com/	Supporting SMEs Enterprise owners to access markets, affordable competent talent and capital, to help them establish decent and sustainable work.
3.		Kenya Association of Manufacturers (KAM) https://kam.co.ke	Advocating for the manufacturing sector. The apparel sector consists of the textile (raw material e.g., fabric) manufacturers, garment manufacturers and the EPZs.
4.		Tailors and Textile Workers Union, Kenya Cotton Growers2 Association (KCGA) https://kenyacottongrowers.blogspot.com/ Kenya Cotton Ginners Association	Advocating for the rights of workers and lobbying for resources to further development Finding new markets and avenues for collaboration.

B. Non-Governmental Companies

SN	SECTOR	AGENCIES	ROLE(S)
FINANCIAL INSTITUTIONS			
1.		Noble Stride Capital http://noblestride.co.ke	Offers financial advice to SMEs.
2.		HEVA fund https://www.hevafund.com	Offers financial support to SMEs.
3.		African Export-Import Bank https://www.afreximbank.com	Offers financial services for export and import.
CIVIL SOCIETY ORGANIZATIONS			
1.	Non- Governmental Organizations	• United Nations Environment Programme https://www.unep.org/ • USAID https://www.usaid.gov/ • International Labour Organization (ILO) https://www.ilo.org/ • Greenpeace https://www.greenpeace.org/	Promote sustainability in the textile industry by advocating and sensitizing on sustainable fashion consumerism, resource management and waste management to prevent pollution and depletion of natural resources thus contributing to climate change. In addition, these NGOs advocate for protection of human rights and elimination of labour injustices in the textile value chain.
OTHER SKILL DEVELOPMENT ORGANIZATIONS			
1.	Innovation Centres	Offered by both the public and private institutions. For example, both state and private universities such as Moi and Strathmore Universities respectively. Others include Chandaria Business Innovation and Incubation Centre, iBiz Africa and iHub.	Offer programmes to promote research activities and innovation. They offer seed funding and relevant skills to help build start-ups.
2.	Training Centres	National Industrial Training Authority (NITA) https://www.nita.go.ke/	NITA develops training curricula, trains, regulates trainers and accredits institutions engaged in skills training for industry. The NITA Textile Training Institute (N-TTI) has a special focus on the T&A industry.

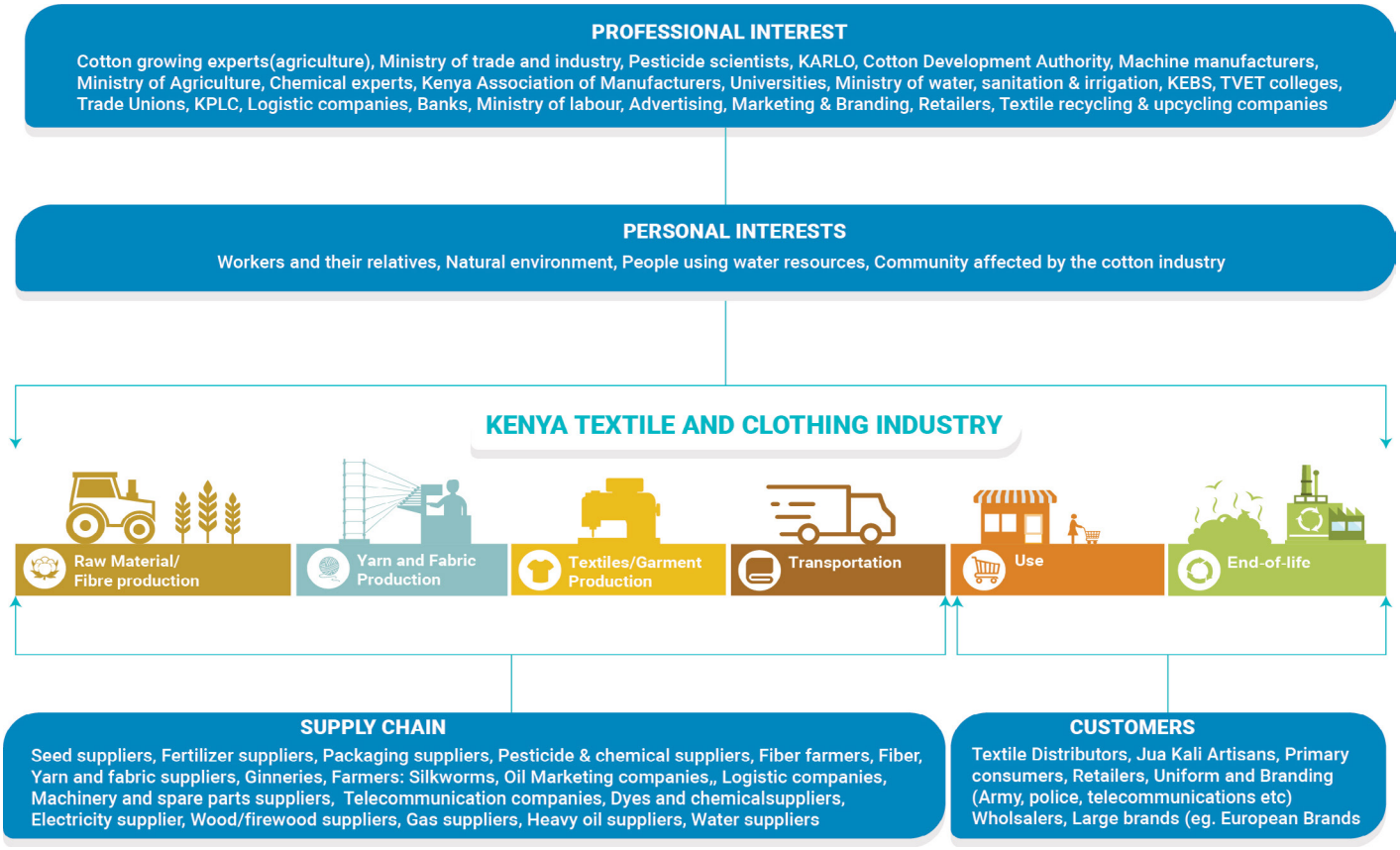


Figure 8: Contribution of Stakeholders in the Kenyan Textile and Apparel value chain

Table 6: The linkage between Clusters and Government departments

SN	Description	Examples	Governmental departments
1.	Fiber producers and ginners	Kenya Cotton Growers Association, Kenya Cotton Ginners Association	Fibre Crop Directorate, Ministry of Cooperative and Marketing, County Governments
2.	Yarn and Fabric manufacturers	Textile mills, Textile SMEs Textiles MSEs	Ministry of Industrialization, Trade and Enterprise Development, Ministry of Labour and Social Protection, NEMA, Ministry of Environment and Forest, County Governments
3.	Apparel manufacturers	Garment manufacturers, Manufacturers of shoes and accessories	Ministry of Industrialization, Trade and Enterprises Development, Ministry of Labour and Social Protection, NEMA, Ministry of Environment and Forest, County Governments
4.	Financial institutions	Long-term and short-term Credit suppliers, long-term capital investment financiers	National Treasury and Planning
5.	Dry cleaning and laundry service providers	Not formally organized	They get operating licenses from county governments
6	Media houses, journalists and advertising agents	Kenya Media Owners Association Independent media houses	Ministry of Information, Communication and Technology, Media Council of Kenya

Table 7: Commonly used East African Standards for textiles and apparel

No.	Standard
1.	EAS 223: 2001, Zipper — Specification
2.	EAS 386: 2005, Used footwear — Inspection and acceptance criteria — Code of practice
3.	EAS 96:2008, Sanitary towels — Specification
4.	EAS 154:2000, Baby napkins — Specification
5.	EAS 220:2001, Knitted polyester fabric — Specification
6.	EAS 222:2001, Knitted polyester/cellulosic blended fabric — Specification
7.	EAS 224:2001, Cotton kangas — Specification
8.	EAS 226:2001, Kitenge — Specification
9.	EAS 227:2001, Knitted cotton fabric — Specification
10.	EAS 228:2001, Cotton bed sheets — Specification
11.	EAS 261:2007, Textile — Determination of pH value of aqueous extracts of textile materials
12.	EAS 155-1:2000, Cotton yarns — Specification — Part 1: Grading by appearance
13.	EAS 250-2:2001, Sewing threads — Part 2: Sewing threads made wholly or partly from synthetic fibres
14.	EAS 253-1:2001, Code of practice for grading of textile materials — Part 1. Fabrics
15.	EAS 356:2004, Code of practice for inspection and acceptance criteria for used textile products

Table 8: List of Selected Kenyan Standards

SN	Standard Number	Title
1.	KS 268:1983	Method for determination of breaking load and elongation at the breaking load of yarns.
2.	KS 526:1985	Method for determination of linear density of yarn (Skein method).
3.	KS 527:1990	Method for determination of twist in yarn.
4.	KS 630-2:1987	Method for determination of tenacity of textile fibres and yarns - Part 2: Yarns.
5.	KS 631:2005	Fabrics - Methods for determination of bursting strength and bursting distension (Second Edition).
6.	KS ISO 105-B06:199	Tests for colour fastness - Part B06: Colour fastness and aging to artificial light at high temperatures - Xenon arc fading lamp test.
7.	KS 1786:2003	Test method for determination of neps, vegetable matter and coloured fiber in wool top.
8.	KS 1785:2003	Test method for determination of shrinkage for textile fibres.
9.	KS ISO 2647:1973	Wool - Determination of percentage of medullated fibres by projection microscope.
10.	KS ISO 1136:1976	Wool - Determination of mean diameter of fibres - Air permeability method.
11.	KS ISO 3073:1975	Wool - Determination of acid content.
12.	KS 1401:2005	Specification for ladies' slips - Part 1: Half-slips.
13.	KS ISO 10306: 2014	Textiles Cotton fibres; Evaluation of maturity by the air flow method
14.	KS ISO 105-J02:1997	Textiles-Tests for colourfastness-Part J02: Instrumental assessment of relative whiteness.
15.	KS EAS 237:2001	Textiles materials - Tests for colourfastness - Colourfastness due to washing.
16.	KS EAS 239:2001	Textiles materials - Tests for colour fastness - Color fastness to rubbing - Part 1: Dry and wet - Part 2: Organic solvents.
17.	KS ISO 16373-3: 2014	Textiles - Dyestuffs Part 3: Method for determination of certain carcinogenic dyestuffs (method using triethylamine/methanol).

5. THE KENYAN TEXTILE AND APPAREL VALUE CHAIN

5.The Kenyan Textile and Apparel Value Chain

5.1 Introduction

As of 2013, Kenya was reported to have 52 mills, with only 15 of them being operational at less than 45% of their total capacity.[84] As discussed earlier, this was attributed to a change of trade policies from a protected import substitution economy to an open market in the 1990's, which allowed cheaper imports. Currently Kenyan is a net importer of T&A products, with an import bill of USD 1004 millions against an export bill of USD 489 millions.[85] As part of this study, it is therefore important to understand the textile value chain with a clear focus on the operations, to identify hotspots across the value chain and establish opportunities to promote Eco-Innovation in Kenya.

5.2 The Textile and Apparel Value Chain in Kenya

5.2.1 Raw Material Extraction/Sourcing and Fibre Pre-processing

(i) Raw Material Sourcing

Raw materials used are either imported or locally produced. Both natural and synthetic (petroleum-based) are used for apparel manufacture, with cotton (on the higher end) and sisal being the mainly used natural fibres. Synthetic fibres majorly used include polyester, acrylic and viscose rayon. Organic cotton is available in Kenya and the East African region but is mainly exported to other regions as it requires further processing due to its low quality.[86] With the decreased local production, 93% of cotton is imported to meet the Kenyan industry's required quality and quantity.[87] Kenyan firms import cotton from cotton-producing countries such as China, India, Uganda and Tanzania. It was worth noting that Kenya imports more T&A goods than it exports. Besides fibre, fabrics and trims are imported from Asia to meet the huge demand at the EPZs where production is done on a cut make trim (CMT) basis for export, especially to the US market. [88]These trims include zips, studs, buttons, interlinings, ribbons and labels among others. Growing of cotton, production of fibre from petroleum and their use in the textile industry are known for causing adverse effects on the environment through emission of hazardous gases and depletion of natural resources; and on humans and other living organisms.

(ii) Yarn Production

Raw cotton fibre is first cleaned in the blow room section of the mill to remove impurities such as seed fragments, stones and sticks. This is followed by carding, combing, drawing, drafting, spinning and winding on bobbins and cones to be used in fabric formation. Processes such as doubling and twisting can be done for special threads used for example in crocheted fabric. In Kenya, this process is mechanized for both natural and synthetic yarn spinning and is therefore less laborious.

5.2.2 Textile Production Weaving /Knitting

The textile production in Kenya includes weaving, wet processing, and garment assembly.

(i) Weaving

Looms/weaving machines mainly used in Kenya are classified depending on the weft insertion mechanisms as projectile, rapier, or air-jet looms. Knitting and weaving machine selection depends on the intended application or the fabric styles to be made, economic factors, flexibility, and durability. This is because the processes are highly mechanized and thus, high investments are made. Less manual/human labour is needed. Weaving technique involves the interlacing of yarns to form a fabric while knitting involves interloping of yarns. Both outputs are preferred in unique instances because of their differing functional and aesthetic properties. Low productivity in weaving and kitting is highly attributed to the use of out-dated technology and low-level skilled labour.

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84 ACTIF (2013). Policy Research on the Kenyan Textile Industry. Available at: https://agoa.info/images/documents/5264/ACTIF%20Report%20on%20Policy%20Research%20on%20the%20Kenyan%20Textile%20Industry_Margaret%20Chemengich_2013.pdf

85 ITC (2023). Data obtained from Trade map, which reports that that data used was based on calculation for data obtained from UN comtrade and Kenya National Bureau of Statistics; Assessed on January 13, 2023 from: https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=1%7c404%7c%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c2%7c1%7c1%7c1

86 Kenya Investment Authority (2016). Strategic Plan (2018-2022); Promoting Investments in Kenya. Available at: https://invest.go.ke/wp-content/uploads/2016/10/KENINVEST-STRATEGIC-PLAN-2018-2022.pdf

87 GOK (2022) Kenya Apparel and Textile Industry; Diagnosis, Strategy and Action Plan. Accessed on July 16, 2022. https://openknowledge.worldbank.org/bitstream/handle/10986/22782/Kenya0apparel00tegy0and0action0plan.pdf?sequence=5

88 Kenya Investment Authority (2016). Strategic Plan (2018-2022); Promoting Investments in Kenya. Available at: https://invest.go.ke/wp-content/uploads/2016/10/KENINVEST-STRATEGIC-PLAN-2018-2022.pdf

(ii) Wet Processing

Newly formed cloth is generally dirty, rough/harsh and unattractive hence it requires considerable skill for conversion into desirable products. Before treatment, the unfinished goods are referred to as grey or grey goods in the case of silk. It is deemed necessary to carry out some preparatory treatment before the application of other finishing processes as any remaining impurities must be removed and additives used to facilitate the manufacturing process too. Wet processing includes all the mechanical and chemical processes employed commercially to improve the acceptability of the product. The objective of these processes is always to make fabric from the loom more acceptable to the consumer by impacting both aesthetic or/and functional properties. These processes include preparatory treatments used before additional treatment, such as bleaching prior to dyeing treatments to improve the dye affinity of fabric; glazing to enhance appearance; and the sizing process that involves application of starch and other sizing agents to impact strength on yarns, so that they can withstand tension during weaving. These processes can also take place after garment manufacture. For example, dyeing can be done on complete garments. Many chemicals are used throughout these processes. Disposal of untreated industrial effluent is one of the major concerns in the textile industry. This poses a health hazard and pollutes the environment and water ways.

(iii) Garment/Home-Textiles Assembly

The Kenyan Cut Make and Trim "CMT" operations take place both in small, medium, and large scale. Small scale operations include home-based or sole-proprietor tailors who serve the local communities. Smaller garment assemblers or factories producing small quantities of garments can be termed as medium scale, for example Rivatex East African Limited which spins yarn, weaves and assembles garments to mainly meet the local demand. Large scale operations take place in huge factories, for example those in the EPZs where production is done for export. The assembly of garment is labour intensive and consists of activities such as cutting of fabric, sewing, ironing and packaging. Other supporting operations include merchandising and quality management. Unlike the wet processing, much water and chemicals are not utilized here. However, many resources are used. The biggest challenge is the poor waste management that results in manufacturers incinerating and landfilling, thus polluting the environment.

5.2.3 Consumption

Distribution and Retail: With many T&A products being imported and exported overseas, ocean freight serves as the main mode of transportation, especially with the economics playing part. Other means used include rail, road, and air transport. Air transport is especially used in transportation of smaller packages or during urgency. For locally consumed products, distribution centres and logistics companies largely make up the internal distribution chain. T&A products are retailed in branded stores, multi-brand stores or in general stores i.e., where various products are retailed e.g., in malls. E-Commerce has also been largely embraced, especially in the wake of the COVID-19 pandemic. **Use:** This stage takes into consideration all operations from the purchasing of the garment to the disposal after use. These include the transport to and from the store, wear, storage of garment, care (laundering, drying, ironing and repair) and the end-of-life solutions that could range from renting, sharing and re-use. Resource utilization can be measured for example by, amount of water used in laundry and the amount and type of energy used in ironing.

5.2.4 End of Life

Both post-consumer and post-industrial textile waste is handled in various ways, and both avail opportunities for promoting of circular value chain in Kenya. Charity organizations such as the Red Cross Society collect garments, footwear, and home textiles from well-wishers for donations to the less privileged. Upcycling firms such as Africa Collect Textiles collect post-consumer products and produce other products such as mats for the local and international market. Both post-consumer and post-industrial waste is also downcycled for operations such as mattress filling and use as wiping rugs in industries. With the inefficient waste collection, sorting and disposal systems, a lot of textile material that could be upcycled and recycled is incinerated or landfilled. This adds up to environmental, air and water pollution. This is also a major issue when it comes to the second-hand market, where much of the textile waste from the global north is exported to Kenya as "mitumba" (i.e. "plastic-wrapped packages of used clothing),[89] where over 30% of the mitumba are unwearable and are discarded as waste.

[89] Greenpeace (2022). Poisoned gifts – From donations to the dumpsite: textiles waste disguised as second-hand clothes exported to East Africa. (www.greenpeace.de) Available at: https://www.greenpeace.org/static/planet4-international-stateless/2022/04/9f50d3de-greenpeace-germany-poisoned-fast-fashion-briefing-factsheet-april-2022.pdf

6. IDENTIFYING SUSTAINABILITY HOTSPOTS ACROSS THE VALUE CHAIN

6. Identifying Sustainability hotspots across the value chain

The steps for identifying the sustainability hotspots can be subdivided into two i.e., creating the life cycle inventory and identifying the life cycle impacts, and sustainability hotspots. Using the value chain flow (Figure 9), the environmental impacts (i.e. sustainability hotspots) were noticed in the following areas:

Life Cycle inventory and Life Cycle Thinking analysis are given in Figure 10 , Table 9 and Table 10.

Considering fiber production, the sisal decortication process was identified as a major water and air pollutant. Kenya produced 22,768 tons of sisal in 2020.[90] For every ton of sisal fibre produced, 24 tons of organic waste is generated, hence the production of 22,768 tons of sisal by Kenya in 2020 led to the co-production of over 546,432 tons of organic waste. When the biomass is disposed of to an open pond for biodegradation, methane (GHG) is emitted[91] leading to serious environmental pollution, especially in Kenya, where waste disposal procedures are poorly implemented. In the textile production, the wet processing (pre-treatment, dyeing and printing) was identified as another hotspot, which contributed to water pollution. Kenya has 21 apparel manufacturing EPZ companies, 120 large and SMEs T&A companies and over 70,000 MSMEs that carry out operations in the T&A sector.[92,93] Printing and dyeing are carried out by 50% of the large and SMEs T&A companies, where NEMA rules on water effluent needs to be adhered to.[94] The disposal of wastewater from a T&A factory may contribute to water pollution if pre-treatment of the effluent is not done. From 1990 to 2018 blue water consumption increased by 69.6%.[95] While NEMA rules are well articulated, (in terms of pre-treatment of industrial water effluent) adherence to the rules is not well documented. The frequent reports of pollution of water ways in areas where manufacturing takes place points to a low adherence to NEMA rules regarding the quality of water discharged from factories. The third identified hotspot in the Kenyan T&A sector was the use stage where washing and laundry of the T&A contributed to contributed to microplastic and water pollution. In Kenya, the T&A sector is one of the sources of plastic pollutants, with polyester polymer (used in fabrics and also packaging) listed as the leading leaking polymer by relative leakage.[96] Analysis of plastic leakage indicated that synthetic textile fibres are one of the sources of microplastics that pollute Kenyan waterways.[97] The microplastics may have been released from land fillings[98] and washing of the T&A goods during use. The fourth identified hotspot in the Kenyan T&A sector was in the end of Life stage, where the post-consumer waste is not well managed, hence contributing to environmental degradation. This waste come from a variety of sources, including discarded clothing and textiles, manufacturing scraps and unsold or returned products. The improper disposal of T&A waste can lead to environmental pollution, soil and water contamination, and the release of greenhouse gases.

In Table 10, the life cycle inventory for a Kenyan made shirt is given. This was done assuming the cotton used to produce the shirt was grown in Kenya, machinery and chemicals imported from Europe and Asia, the processing of the cotton, yarn, fabric, and shirt done in Kenya and the shirt was sold, worn and discarded in Kenya.

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90 Crop Biotech Update. (2020). Long Wait Over as Kenya Finally Commercializes Bt Cotton, https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=18017

91 Broeren, M. L., Dellaert, S. N., Cok, B., Patel, M. K., Worrell, E., & Shen, L. (2017). Life cycle assessment of sisal fiber–Exploring how local practices can influence environmental performance. Journal of cleaner production, 149, 818-827.https://www.sciencedirect.com/science/article/abs/pii/S0959652617302871

92 KNBS, (2015). Impact of AGOA, Kenya Economic Survey, as reported by EPZA. Available at: https://www.knbs.or.ke/download/economic-survey-2015/

93 Aarti Krishnan, Dirk Willem te Velde & Anzetse Were. (2019) Integrating Kenya's small firms into leather, textiles and garments value chains. Background paper on Creating jobs under Kenya's Big Four agenda. https://africacheck.org/sites/default/files/MSMEs-Big-4-Kenya-Background-Document-May-2019.pdf

94 GOK (2006). Water quality regulations. Available at: https://www.nema.go.ke/images/Docs/water/water_quality_regulations.pdf

95 SCP. (2022). SCP Hotspot Analysis. Available at: http://scp-hat.lifecycleinitiative.org/countries-at-a-glance/

96 IUCN-EA-QUANTIS, (2020). National Guidance for Plastic Pollution Hotspotting and Shaping Action, Country report Kenya. Available at: https://plastichotspotting.lifecycleinitiative.org/wp-content/uploads/2020/12/kenya_final_report_2020.pdf

97 UNEP (2020). Kenya Final Report. National guidance for plastic Pollution Hotspotting and Shaping Action – Life Cycle Initiative. Available at: https://plastichotspotting.lifecycleinitiative.org/wp-content/uploads/2020/12/kenya_final_report_2020.pdf

98 Changing markets (2023). Trashion: The stealth export of waste plastic clothes to Kenya. http://changingmarkets.org/wp-content/uploads/2023/02/Trashion-Report-Web-Final.pdf

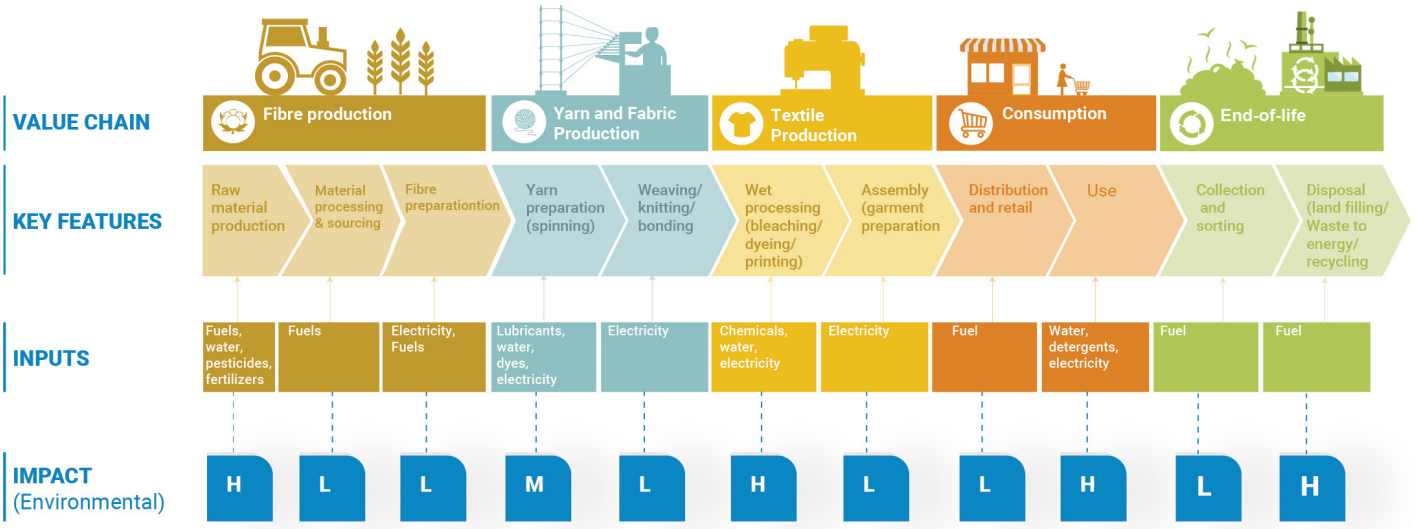

Figure 9: The value chain flow in Kenyan textile and apparel sector (Key: H=High; M=Medium; L=Low)

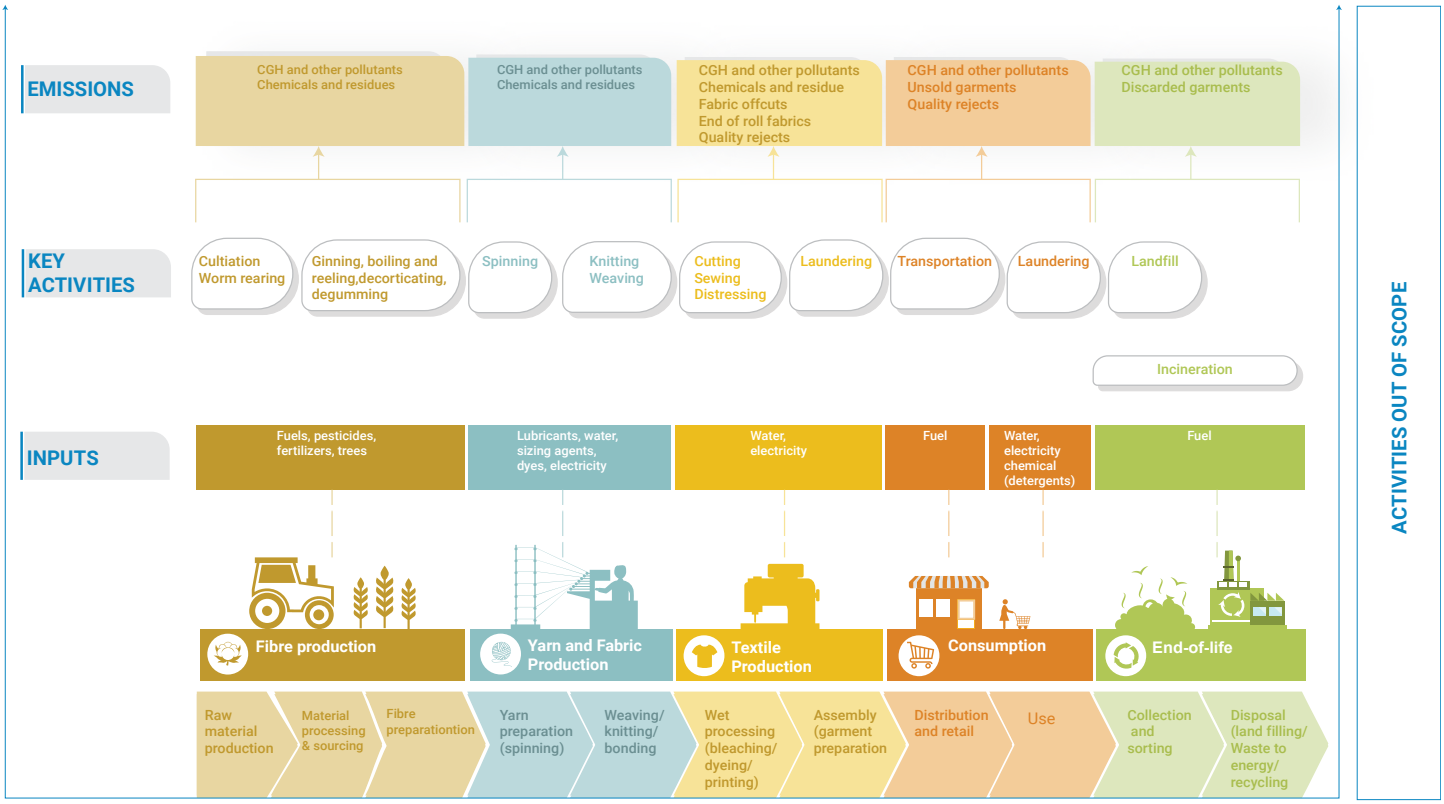

Figure 10: Life Cycle Inventory for Kenyan Textile and Apparel Value chain

Table 9: Life Cycle Thinking Analysis for Kenyan Textile and Apparel value chain

Phase	Activity	Inputs	Product(s)/ Output(s)	Emissions	Environmental Impacts (Resource Use)	Environmental Impacts (Ecosystem Quality)	Social Impacts on Workers	Social Impacts on Consumers	Social Impacts on Stakeholders	Economic Impacts (Profitability)
Phase 1: Production of Raw Materials										
Cotton Farming	Cultivation of cotton	Water, pesticides, fertilizers	Cotton fibres Cotton seeds	GHGs, chemical residues and solid waste (Biomass)	Resource depletion fossil fuels (L)	Climate change (M) Biodiversity (M)	Health risks to farmers (L) Falling wages for farm workers (M)	Ethical issues (L)		-Revenue to cotton farmers (M) -Increasing costs of imported inputs and reduced yields due to reliance on rain leads to reduced profitability in the sector (M)
Sisal Farming	Cultivation and processing of sisal	Water, Fuel	Sisal fibres and biomass (only 4% is fibre)	GHGs (from the decomposing biomass) waste water and solid waste (short fibers)	Water usage(H), Land usage (L)	Climate change (M) Biodiversity (H)	Health risks to workers (M) Noise pollution (M)	Ethical issues (L)	Water pollution affects those who live downstream (M)	-Revenue from sale of sisal fibers (M) -Low yields in drought years may lead to lower profits (M)
Sericulture	Silk production through sericulture	Water, Fuel, degumming chemicals.	Silk fibre Pupa Biomass	GHGs and solid waste	Mulberry leaves (M) Fuel (L)		Workers Health (L)	Ethical concerns regarding silk processing and labour conditions (L)		Revenue to silk farmers (M)
Imported Materials	Acquisition of synthetic fibres and other imported materials	Crude oil,fuels	Synthetic fibre (Polyester, Acrylic filament or staple fibre)	-GHG emissions, -Chemical residues	Resource depletion -crude oil (M)	Climate change (M)	Job creation (M)			Revenue to importers who resale the goods (M)
Phase 2: Manufacturing										
Yarn & Fabric Production	Yarn spinning, fabric weaving and manufacture of non-woven fabrics	Fibers, electricity	Yarn and fabric	GHG emissions -Solid waste	Energy consumption (M)	Climate change (L)	Job loss (H) - Workers have faced job losses due to factory closures		Reduced economic activities (H) -Factory closure affected other stakeholders relying on the workers income	-Revenue from sale of yarn and fabric (M) -Job losses (H) –Job losses can affect sector performance leading to lower economic growth
Dyeing and Printing	Dyeing and printing of yarn and fabric	Chemicals, water, energy, electricity	Dyed and printed yarn and fabric	-GHG emissions, -Chemical residues	Chemical (H), Water (H), and Energy usage (L)	Climate change (H) Biodiversity (H)	Job losses (H) Workers may face job losses due to factory closures. Workers Health (M)-health issues due to chemical exposure	Some finishes may cause allergies and skin irritation	Pollution of water sources (H)	Job losses (H) – Job losses can affect sector performance leading to lower economic growth
CMT (Cut, Make & Trim)	Assembling garments from fabric and accessories	Fabric, thread, zippers, buttons, electricity	Finished garments Fabric off-cuts	Solid waste, GHG emissions	Resource depletion -Energy and fabric (H)		Workers Health (M) - Workers may face health risks due to repetitive tasks and long working hours			Income generation (H) Reduced company profits (M) - Production costs may be increased due to higher energy cost and frequent power outages, leading to use of much expensive diesel generators

Phase	Activity	Inputs	Product(s)/ Output(s)	Emissions	Environmental Impacts (Resource Use)	Environmental Impacts (Ecosystem Quality)	Social Impacts on Workers	Social Impacts on Consumers	Social Impacts on Stakeholders	Economic Impacts (Profitability)
Phase 3: Distribution and Retail										
Transport (Factory to Warehouse/ Distribution)	Transporting textiles from factory to warehouse or distribution centres	Fuel	Textiles at distribution centres	-GHG emissions	Fuel usage (L)	Climate change (L)	Drivers have jobs (M)			Revenue to transportation companies (M)
Transport (Warehouse/ Distribution to Retail)	Transporting textiles from warehouse to retailers	Fuel	Textiles at retail outlets	-GHGs - Solid waste	Fuel usage (L)	Climate change (L)	Drivers have jobs (M)			Revenue for transportation (M)
Sale at Retail	Selling textiles through retailers	Fuel	Sold textiles	-GHG emissions solid waste (from packaging)	Resource depletion -Electricity (L)	Climate change (L)	Workers have job security in retail (L)			Revenue for retailers (M)
Local and Export Market Sales	Selling products in both local and export markets	Fuels	Revenue from sales	-GHG -emissions -Solid waste	Resource depletion -fossil fuels (L)	Climate change (L)	Workers have jobs in logistics (L)			Revenue for Logistic companies (M)
Wholesaling	Selling products in bulk to wholesalers	Fuels	Revenue from sales	-GHG emissions	Resource depletion - fossil fuels (L)	Climate change (L)	Workers have jobs (L)			Revenue for wholesalers (M)
Retailing	Selling products to end consumers	Electricity	Revenue from sales	-GHG emissions -Solid waste (from packaging)	Resource depletion –fossil fuels (L)	Climate change (L)	Workers have jobs in shop management (L)			Revenue for retailers (M)
Exporting	Selling products in the international market	Fuels	Revenue from exports	-GHG emissions	Resource depletion -fossil fuels (L)	Climate change (L)	Workers have jobs in logistics (L)			Revenue for logistic companies (M)
Transportation	Facilitating the movement of goods	Fuels	Textiles	GHG emissions	Resource usage -depletion-fossil fuels (L)	Climate change (L)	Jobs for drivers (M)			Revenue for the transportation company (M)
Communication	Facilitating information exchange	Electricity	Informed clients		Resource depletion -electricity (L)	Climate change (L)	Jobs in communication (L)	Advertising messages (L)	Advertising messages (L)	Revenue for communication companies (M)
Marketing and Branding	Promoting and enhancing the brand and products	Fuels, Electricity	New clients	GHGs emissions	Resource depletion -fossil fuels and electricity (L)	Climate change (L)	Jobs in marketing and branding (L)	Advertising messages (L)	Advertising messages (L)	Revenue for marketing and branding (M)

Phase	Activity	Inputs	Product(s)/ Output(s)	Emissions	Environmental Impacts (Resource Use)	Environmental Impacts (Ecosystem Quality)	Social Impacts on Workers	Social Impacts on Consumers	Social Impacts on Stakeholders	Economic Impacts (Profitability)
Phase 4: Use/Consumption										
Purchasing	Consumers purchase textile and apparel products	Electricity	Owned textile and apparel products	GHG emissions	Resource depletion - fossil fuels (L)	Climate change (L)	Jobs in sales (L)			Revenue for the sales (M)
Usage	Consumers use purchased textile and apparel products		Utilized products							
Washing	Cleaning textile and apparel products Ironing to remove wrinkles and enhance appearance	Cleaning agents, water, electricity	Clean and refreshed products	GHG emissions -Solid waste (microplastics)	Resource depletion fossil fuels (L) -Water usage (M)	Climate change (L) Biodiversity (L)	Jobs in washing and laundry (M)	Consumers enjoy clean and well-maintained textiles (L)		Revenue for utility (water, electricity) washing and laundry companies
Ironing	Ironing to remove wrinkles and enhance appearance	Electricity	Neat and wrinkle-free products	-GHG emissions	Resource depletion (energy) (M)	Climate change (L)	Jobs in washing and laundry (L)	Neat and professional appearance (L)		Revenue for utility (water, electricity) washing and laundry companies
Phase 5: End of Life										
Collection, Sorting, Recycling, and Reuse	Collecting, sorting, recycling, and reusing textiles	Electricity	Sorted textiles for recycling or disposal	GHG emissions -Solid waste	Resource depletion-fossil fuels (L)	Climate change (L)	Jobs in collection and sorting (L)	Consumers have a chance to dispose off worn out textiles (L)		Revenue to the collection, sorting and recycling companies
Incineration	Incinerating textile waste	Electricity, fossil fuel	Incineration by-products	GHG emissions	Resource depletion (energy) and fossil fuels (M)	Climate change (L)	Jobs in site management (L)		Disturbance due to air pollution (M)	cost of incineration (L)
Landfilling	Disposing of textiles in landfills	Fuel, GHG emissions, microplastics	Landfilled textiles	-Solid waste, -GHG emissions	Fuel, emissions, and microplastics (M)	Biodiversity (M): May affect ground water -Climate Change (L)	Jobs in site management (L)		-Costs of landfilling (L) -Disturbance due to rotting textiles (L)	Cost of landfilling (M)

The Kenyan made shirt was selected because it is a typical article that is manufactured in the Kenya T&A sector, and it gives an insight on the life cycle inventory of typical garments in the T&A sector.

Table 10: Life Cycle Inventory: Kenya Cotton Industry-Kenyan shirt

Details	Fiber Production	Yarn and Fabrics production	Wet processing (dyeing & Printing)	Garment Production	Consumption	End-of-Life
Emissions	GHG and other pollutants chemical residue	GHG and other pollutants chemical residue	GHG and other pollutants chemical residue	GHG and other pollutants chemical residue	GHG and other pollutants	GHG and other pollutants
Key activities	Cultivation, ginning, wet spinning	Spinning, weaving	De-sizing, scouring, bleaching, dyeing, printing, finishing, laundering	Cutting, sewing	Transportation, laundering	Incineration, landfill
Inputs	Fuel, pesticides, fertilizers	Lubricants, water, sizing agents, electricity	Dyes, pigments, chemicals, Water, electricity	Garments, sewing threads, buttons, water, electricity, chemicals, (detergents)	Water, detergents, electricity (minimal)	Fuel [99]

[99] Nzila, C., Njuguna, D., Dewulf, J., & Spanjers, H. (2016). Enhancing the environmental profile of an African cotton textile through biowaste recovery and valorization. Int. Res. J. Eng. Technol, 3, 11-19.

7. IDENTIFIED OPPORTUNITIES AND THREATS ACROSS THE VALUE CHAIN

7. Identified opportunities and threats across the Value Chain

The identification of opportunities and threats across the value chain was done using the PESTEL (Political, Economic, Social, Technological, Environmental and Legal) method and the results are given in Table 11, where Impact (1=very low, 5=very high) and likelihood (1-very unlikely and 5=certain) and significance are indicated.

Table 11: PESTEL Assessment for Kenyan Textile and Apparel Industry

	Description	Timing (months)	Impact	Likelihood	Significance
Political	**Policy context:** • The prevailing local tax policy, labour and environmental laws are generally supportive towards the growth of the sector.	6-12	4	3	12
	Trade restrictions and tariffs: • Kenya and EU launched a strategic dialogue on the implementation of the East African Community trade partnership (EU, 2021).[100] The partnership is geared towards elimination of trade restrictions and tariffs on Kenyan products including T&A. Moreover, the EU strategy for Sustainable Textiles further aims at tackling problems in the textile industry.[101] • Kenyan industries have access to large markets since the country has signed Preferential Trade Agreements with trading partners having a total population of over 1.4 billion people and a market value of over USD 29 trillion. The treaties include Africa Growth and Opportunity Act (AGOA), the Economic Partnership Agreement (EPA) with the European Union and the Generalized System of Preferences (GSP) scheme that grants preferential duty treatment to more than 3,000 of Kenya's export products across different markets. (ITC,2002).[102]	12-24	3	5	15
	Political stability: • Political stability in Kenya is critical for the textile industry. The Kenyan setting is largely peaceful and stable except around general elections when the country has occasionally experienced politically motivated skirmishes that have disrupted the value chain. Meanwhile, since the advent of multi-party democracy in the country in 1992, changes in government have always led to significantly continued support towards the national sustainability policies. Successive governments have continued to pursue the country's vision 2030 which focuses on transforming Kenya into a competitive export-led and efficient domestic economy.	7-24	4	5	20
	Government's influence: • The Government of Kenya has influenced the sector's growth through several interventions including support in higher education and training in T&A sector, sustainable procurement principles and the development of favourable laws, legislations and policies that support the sector. Politically there is a prioritization from the government on the textiles industry (thus relevant policies and guidelines have been put in place including the ***"Buy Kenya build Kenya"*** and the ***"Made in Kenya"*** branding). Other policies focus on improving physical infrastructures.	6-36	4	4	16
	• **The availability of infrastructure** including electricity, better roads, and continuous water supply among other industrial inputs are crucial to Kenyan manufacturers. Any disruptions in the national infrastructure could potentially constrain shipping times and limit the international competitiveness of local textile companies besides rendering the supply chains to become unreliable.				

100 European Union (EU), 2021. The European Union and the Republic of Kenya launch strategic dialogue and engage towards implementing the East African Community Economic Partnership Agreement, https://trade.ec.europa.eu/doclib/press/index.cfm?id=2279
101 European Commission (2022). EU Strategy for Sustainable and Circular Textiles. Available at: https://environment.ec.europa.eu/publications/textiles-strategy_en
102 International Trade Centre. (2020). Kenya Textile and Apparel Sector Profile.
https://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Sectors/Textiles_and_Apparel/Country_Profiles/Kenya%20Sector%20Profile%20-%20Textile%20and%20Apparel%20-%20%20April%202020.pdf

	Description	Timing (months)	Impact	Likelihood	Significance
Economic	**General economic situation in the value chain:** • **Kenya's economic growth** has remained steady over the last decades. In 2022 the GDP growth and inflation rate was 5.5% and 7.6% respectively.[103] The GDP growth was mainly driven by services and household consumption on the supply side and demand side respectively whereas the inflation was driven mainly by food and energy inflation. Generally, investors from Asia and the Middle East are among the main actors driving growth in Kenya's garment industry especially in the EPZ. • **The economic performance of countries served by the Kenya's textile value chain:** The main export partners for T&A goods from Kenya are USA (72%). EU (4%), Nigeria (3.1%), Uganda (3%) and Rwanda (1.4%). — **USA:** The real GDP is projected to grow by 1.6% in 2023 and 1.0% in 2024. Growth in private consumption is expected to moderate in response to the tightening in monetary and financial conditions, and as savings is further depleted.[104] The Apparel market in the US is large and it is forecasted to exceed USD 300 Billion in 2023, therefore Kenya can leverage on the steady growth of its textile sector to increase its share of the huge market. — **EU:** The EU economy outlook records a growth of 0.8% in 2023.[105] The EU apparel market is estimated at over USD 470 Billion with a forecasted growth rate of 2.1%. — **Nigeria:** The real GDP growth was 3.3% in 2022.[106] The main T&A export from Kenya to Nigeria is sisal fibre.[107] — **East Africa:** Kenya exports its apparel and yarn to the East African countries (Rwanda and Uganda), which has projected growth rate of 5% for 2023 to 2024 financial year.[108] The apparel market is estimated at USD 5.7 billion with a growth of 3.6 % • **Exchange rate:** The Kenyan shilling has depreciated to 146.8 per US dollar during the last quarter of 2023 from 123.3 at the end of 2022. However, the capital adequacy ratio and liquidity ratio of 18.9 and 55% respectively were much higher than the respective targets of 14.5 % and 20%. [109] **Ease of doing business and Interest rates:** Kenya is a very attractive investment destination with respect to investors' ease of accessing credit and attracting investment. Hence, the country has consistently remained among the top ranked countries in the region.[110]	12-36	3	3	9
	Market competition: • The competitive landscape in the international textile market is quite intense, especially from China. Such imported goods pose a challenge for the local industry in terms of low prices. Significant growth and hence stiff competition are also projected from the second-hand apparel market whose competition is projected to double and reach USD 77B in the period 2021-2025.[111] **Counterfeit products** made in China and Turkey using labels of Kenyan producers have been said to be entering the textile market where they are sold at 20-30%[112] of the original product price thus posing unfair competition to the locally made products.	0-12	3	3	9
Social	**Social trends, demographics, and cultural aspects:** • **The social trends** globally are that consumers, retailers, and wholesalers of textiles have become more attuned to environmental and social standards. The industry buzz is "green products" hence most consumers are progressively demanding products produced in energy efficient facilities.[113] • **Demographically** Kenya has very diverse population. Besides, the country is a member of the East African Community and the 21-member Common Market for East and Southern Africa (COMESA), whereby the demographics span a market of over 280 million and 600 million people respectively. The Africa Continental Free Trade Area is expected to make it even easier to market Kenyan-made goods to all consumers across the continent. • Women constitute most of workers in the garment industry in Kenya. The gender distribution in the garment factories is about 62-81% in favour of women as compared to men 19-38% for men. In contrast, women leaders in executive positions as employees or owners of T&A manufacturing units are 13% as compared to 78% for male leaders. In addition, while women in Kenya are equally well educated as compared to their male counterparts, they desire to serve in senior management within the sector, but cultural barriers and ignorance have deterred the full implementation of gender equity in the sector's top management.	12-24	3	2	6
Technological	**R & D activity and automation:** The T&A Sector in Kenya has a weak innovation, research, and development ecosystem. To overcome these challenges, UNIDO avers that the industry needs to invest more in research and development to develop new technologies that are adapted to the local context. The government can also play a role in supporting technology transfer and innovation through policies and programs that encourage investment in technology and eco-innovation. The development of new and innovative manufacturing techniques including automation and sustainable materials that can improve the quality of textiles produced in Kenya and provide a competitive advantage in the global market.[114]	12-48	4	3	12

103 OECD (2023). OECD Economic Outlook, Volume 2023 Issue 1: United States https://www.oecd-ilibrary.org/sites/a50dd05f-en/index.html?itemId=/content/component/a50dd05f-en#:~:text=Real%20GDP%20is%20projected%20to,as%20savings%20are%20further%20depleted
104 OECD (2023) Going for Growth 2021 - United States, https://www.oecd.org/economy/united-states-economic-snapshot/
105 EU (2023). Summer 2023 Economic Forecast: Easing growth momentum amid declining inflation and robust labour market. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4408
106 African Development Bank Group (2022). Nigeria Economic Outlook: Recent macroeconomic and financial developments. https://www.afdb.org/en/countries-west-africa-nigeria/nigeria-economic-outlook
107 Nigeria: Sisal Market. https://www.wm-strategy.com/nigeria-sisal-market
108 African Development Bank Group (2022). East Africa Regional Economic Outlook 2023: Mid-term growth for East Africa region projected highest on the continent for 2023-4. https://www.afdb.org/en/news-and-events/press-releases/east-africa-regional-economic-outlook-2023-mid-term-growth-east-africa-region-projected-highest-continent-2023-4-63483
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	Description	Timing (months)	Impact	Likelihood	Significance
	Technology incentives and rate of technological change within the value chain: • **The rate of technological change** within the value chain is regarded as low since according to United Nations Industrial Development Organization (UNIDO); despite of investments in the value chain, the industry still faces challenges in terms of access to technology. Most companies cannot afford to invest in modern machinery, and there is a lack of government support for technology transfer and innovation. This has led to a situation where the industry is heavily reliant on imports of machinery and other inputs, which can be expensive and affect the industry's profitability.[115] • **Adoption of Technology:** The Kenyan T&A industry has been slow to adopt new technologies. The lack of modern technology has affected the industry's competitiveness and productivity. According to a report by the UNIDO, most of the T&A firms in Kenya use out-dated machinery, resulting in high production costs and low-quality products.[116] The use of old machines and slow rate of adoption of new technologies could be caused by high cost of finance in Kenya that renders procurement of new technology to be comparatively higher. The government has recognized the importance of technology in the industry and has implemented initiatives to support the adoption of modern technologies. Specifically, the government has launched the Kenya Industrial Transformation Program (KITP), which aims to promote the use of technology in the T&A industry to improve competitiveness and productivity. There are some signs of changes in the industry, with some companies adapting new technology. For example, Rivatex East Africa limited has invested in modern equipment such as ring spinning machines and fabric dyeing machines, which have helped to increase production and improve the quality of their products. • **Use of digital technologies** such as e-commerce platforms and social media has enabled companies to reach a wider market and promote their products. The Kenyan T&A industry has witnessed the emergence of online marketplaces such as Jumia, Kilimall, and Masoko, which have enabled companies to sell their products online and reach a wider audience.[117]	0 -24	4	4	16
	• **Access to Technology:** UNIDO in 2017 reports that despite these investments, the industry still faces challenges in terms of access to technology. Most companies cannot afford to invest in modern machinery, and there is a lack of government support for technology transfer and innovation. This has led to a situation where the industry is heavily reliant on imports of machinery and other inputs, which can be expensive and affect the industry's profitability.[118]	0 - 6	2	3	6
Environmental	**Abundance of raw materials and eco-labelling practices:** • The supply and quality of cotton produced in Kenya remains a key factor. The industry must decide between buying cotton from local farmers and processing it to the quality needed for production or import raw materials or fabrics of consistent better quality at higher costs. However, any complacency at the ports or lax customs enforcement could potentially permit the infiltration of counterfeits as well as poor quality fabric. • The growing concern for the environment has led to the adoption of sustainable technologies in the T&A industry in Kenya. Materials, such as organic cotton and recycled polyester, are being used by some companies. Additionally, eco-friendly production processes such as the use of biodegradable dyes are being adopted to minimize the environmental impact of the industry.[119] • **Eco-labelling practices** — According to the ecolabel index, Kenya subscribes to about 17 ecolabels.[120] In the textile value chain, the main ecolabels that are being implemented by the leading companies include the fair trade and the Institute for Market ecology (IMO) certification marks. However, it has been reported that locally, ecolabelling does not play a key role when purchasing products.[121]	12-36	3	2	6
	Environmental policy and regulation: • Kenya has enacted several environmental policy and regulation[122] including legislations which address environmental management as well as occupational health and safety initiatives focusing on chemical use and exposure. Besides, several voluntary mechanisms that have been proposed by the UNEP[123] have also been adopted by the country. This includes cleaner production techniques, environmental management systems among others. • **Long-term risks from climate change:** The textile value chain is prone to long term risks to climate change including droughts and floods which adversely affect the production of rain fed cotton.	12-36	2	3	6

115 United Nations Industrial Development Organization (2017). Kenya Textile and Clothing Sector Diagnostic. Retrieved from https://www.unido.org/sites/default/files/files/2017-06/Kenya-Textile-and-Clothing-Sector-Diagnostic.pdf
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	Description	Timing (months)	Impact	Likelihood	Significance
Legal	**Legislation:** • Kenya and the EU concluded negotiations for Economic Partnership Agreement (EPA) on 19 June 2023.[124] The EPA stipulates that EU will give duty-free and quota-free access to the EU market for all Kenyan exports, while Kenya commits to the partial and gradual opening of its market. The EPA contains strong trade and sustainability commitments, including binding provisions on labour matters, gender equality, environment, and the fight against climate change. In addition, Kenyan exports benefit from duty-free access to the American market according to the AGOA.[125] Kenya's legislation permits the trade in second-hand clothes whereas the African Community agreed to ban importation of second-hand clothes by 2019. Rwanda has effected the ban, Tanzania and Uganda have increased tax on imported second-hand clothes. Kenya however decided to continue the trade.[126] While second-hand clothes have a significantly lower environmental impact as compared to new textiles, the (economic) competition from this market could potentially become a hindrance to eco-innovation along the textile value chain.	12-24	3	4	12

124 EU-Kenya agreement: https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/east-african-community-eac/eu-kenya-agreement_en#:~:text=The%20EU%2DKenya%20Economic%20Partnership,to%20enhance%20Kenya's%20economic%20development
125 Shiundu A. (2022). Kenya's textile and apparel sector is struggling with various bottlenecks. https://www.dandc.eu/en/article/kenyas-textile-and-apparel-sector-struggling-various-bottlenecks
126 Franck Kuwonu (2018). Protectionist ban on imported used clothing: US threaten East Africa with AGOA expulsion. Available at: https://www.un.org/africarenewal/magazine/december-2017-march-2018/protectionist-ban-imported-used-clothing

8. DEVELOPING A VALUE CHAIN VISION

Several Government of Kenya (GOK) documents indicate that the textile industry is one of the industrial sectors, which can be used to spur economic growth.[127,128] The Kenya Industrial Transformation Programme (KITP) of 2015 which is anchored to the Kenya Vision 2030 aims to launch flagship projects in textiles to support Kenyan SMEs and create an enabling environment to accelerate industrial growth. Under this program the Government aims at developing an integrated textile industrial park, also referred to as a textile city, in Naivasha, to attract potential investors.

The government through Kenya Export Promotion and Branding Agency has developed a 'Made in Kenya Brand Mark' which aims to promote locally manufactured products in the local and global markets. Kenya Industry and Entrepreneurship Project (KIEP) has also been initiated through the Ministry of Industrialization, Trade and Enterprise Development to strengthen innovation and entrepreneurship ecosystem, increase productivity and innovation at firm level and provide project implementation and monitoring and evaluation support for different industry sectors. Fibre Crops Directorate was also established in 2014 to regulate, develop and promote fibre value chains such as cotton and sisal in the country. It is therefore apparent that both the government and private actors have generally acknowledged that business as usual can no longer work for the Kenyan T&A industry. The value chain vision for the Kenyan T&A companies therefore involves various aspects that contribute to the overall efficiency, sustainability, and competitiveness of the industry. Based on the PESTEL analysis results as well as the identified key value chain hotspots, the following aspects are of particular interest:

01 SUSTAINABILITY AND CIRCULARITY

The T&A industry is focusing on adopting sustainable practices including enhanced use of natural fibres, dyes, and bio-based processes to minimize environmental impact, contribute to circular economy, and create new jobs in different stages of the value chain.

02 SUPPLY CHAIN MANAGEMENT

Effective supply chain management is critical for the T&A industry because prudent management of processes, people, and information is critical in ensuring smooth and timely flow of goods and services.

03 DIGITIZATION

Increased skills and capability development in the digital economy has become crucial in the global space. The incorporation of digital technologies and processes, including 3D design software, Computer-aided Manufacturing, and automation, can help the T&A industry to streamline operations, reduce costs, and increase competitiveness

04 FURTHER SUPPORT TO INDEPENDENT BUSINESSES

The Kenyan T&A sector is subjected to various challenges including stiff competition from large importers as well as companies in neighbouring countries with lower production costs and tax regime; weakening of Kenya shilling thus affecting costs of imported spare parts, raw materials, and chemicals; higher costs of power; threats from workers unions and fears over the end or changes in trade agreements. The need for enhanced support to independent T&A businesses is therefore warranted

To address these aspects, the companies in the T&A sector can focus on the following priority actions:

01• Engaging in improved and sustainable business practices and sourcing of raw materials.
02• Implementing best practices in supply chain management
03• Investing in infrastructure development
04• Adopting digital capability development and transformation strategies
05• Collaborating with higher education institutions, research centres and industry partners to develop innovative and sustainable products and services
06• Lobbying for targeted sector policies from the government and sustained commitment of all the value chain participants including consumers, retailers, and suppliers

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9. CONCLUSION

This report carried out a market assessment for the Kenyan T&A value chain, by considering the potential threats, partners, hotspots, opportunities, and threats. An overview of the Kenyan T&A sector indicated that the sector had an upward rise to 1980's when it started a downward spin. By 1990, several interventions, which include (but not limited to) the introduction of Export processing zones and the AGOA program, the sector showed some level of revival, with increase of export. However, the growth of the sector has not kept up with the needs of the country and by 2022, Kenya was still a net importer of T&A goods. The import partners for Kenya are China, India, Pakistan, EU and Tanzania, while over 70% of Kenya T&A exports went to the US. Other export partners include EU, Nigeria, Uganda, and Rwanda.

This market assessment identified several governmental and non-government actors critical for the implementation of eco-innovation strategies which include, the Ministry of Trade and industry, Kenya Association of Manufacturers, SMEs advisory Unit in the Office of the President, National Environmental Authority (NEMA), Kenya Bureau of Standards (KEBs) and National industrial training authority (NITA).

The key hotspots identified include solid waste mismanagement, intensive water consumption and pollution from wet processes, microplastic pollution from synthetic fibres, released during washing and landfilling, and water and air pollution from cotton dust and end of life mismanagement of post-consumer waste, higher cost of energy, threats from workers unions as well as fears due to uncertainty around trade agreements such as AGOA. The key aspects of particular interest that have been identified can therefore be summarised as sustainability and circularity, supply chain management, digitization, and further support to business in the T&A sector.

The priority actions essential for addressing the aspects include:

01• Engaging in improved and sustainable business practices and sourcing of raw materials.
02• Implementing best practices in supply chain management.
03• Investing in infrastructure development.
04• Adopting digital capability development and transformation strategies.
05• Collaborating with higher education institutions, research centres and industry partners to develop innovative and sustainable products and services.
06• Lobbying for targeted sector policies from the government and sustained commitment of all the value chain participants including consumers, retailers, and suppliers.

Implementation of Eco-innovation strategies could benefit the Kenya T&A sector in several ways, including: Increased fibre production and processing; Increased worker productivity through training; Increased local fabric and garment manufacture; Expansion of the export market; Increased sustainability and circularity in the textile industry; Creation of new jobs at different stages of the value chain and job security; Support of local businesses and products as well as Increased skilled workforce.

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