ISSUE 1, VOLUME 1
APRIL 2025

The Textiles OBSERVER

The Importance of Fiber Preservation

Helping Brands with Traceability

From Net-Zero to Nature-Positive

PREVIEW:

The inaugural 'Textiles in ICAC Member Countries Report'

Letter from the Editor

Cotton + Textiles for a Better Tomorrow

Kanwar Usman
Head of Textiles

INTERNATIONAL COTTON ADVISORY COMMITTEE

Textiles play a pivotal role in the global economy due to their broad range of applications from clothing and home furnishings to industrial and technical uses. As everyday essentials, textiles are not only economically significant but socially transformative.

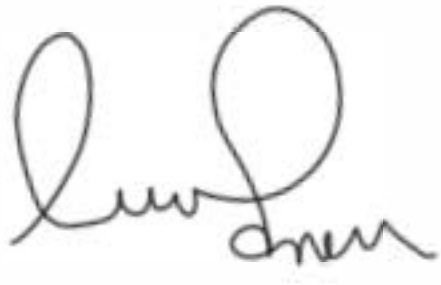
Their labor-intensive production, especially in developing countries with competitive labor costs, has created vast opportunities for industrial growth, economic diversification, and job creation. The textile sector acts as a gateway for many economies to engage in global production networks and value chains, enabling specialization, technology transfer, and sustainable industrialization.

This inaugural edition of the ICAC Textiles Observer reflects our strong commitment to integrating textiles into ICAC's global mission. It features four insightful contributions from leading voices in the industry.

This publication marks the beginning of a long-term effort to mainstream textiles into ICAC's work and global development discourse. We hope the perspectives shared here will inspire meaningful dialogue, enhance collaboration, and promote forward momentum among our member countries and the wider global textiles community.

Together, we can create a future where cotton and textiles grow hand-in-hand — fostering innovation, inclusion, and sustainability.

We hope you enjoy this first edition of The Textiles Observer. Please send your comments and suggestion to usman@icac.org



The Textiles OBSERVER

Helping Brands Achieve Traceable Cotton Supply Chains

By Alison Ward, CEO, CottonConnect

Executive Summary

Achieving product transparency and traceability has become a priority for the textile and clothing industry. Consumers are increasingly discerning, seeking to know more about the origins of their purchases. Brands are striving to enhance the assurances they provide, supported by new sustainability regulations, with many aiming for 100% traceable materials in their supply chains by 2030.

Digital traceability tools are critical to achieving supply chain transparency and meeting the scale needed for significant and urgent change. Platforms like CottonConnect's TraceBale allow brands to track supply chains from raw material to finished goods, collecting essential data at every stage. This traceability provides brands with a much clearer picture of their supply chain, enabling targeted sustainability improvements and substantiating claims they make to meet their ESG goals.

Meeting the Challenges

The global textile and apparel industry is grappling with several challenges, including unpredictable market conditions, changing geopolitical scenarios (including labor issues in certain countries), and the impact of global climate crises, such as the catastrophic floods in Pakistan in 2022. Adding to this, stricter government regulations on sustainability claims, new reporting standards, and evidence-based impact requirements from investors have placed sustainability and traceability as top priorities for retail brands.

Traceability is particularly challenging in the cotton supply chain due to its complexity. From its origins as an agricultural commodity to its transformation into a finished textile product, cotton goes through multiple processes, involves numerous agents, and crosses global borders. Establishing traceability within this supply chain is crucial to understanding the conditions in which cotton is produced, manufactured, and processed.

With many brands working towards the goal of 100% material traceability by 2030, the textile and apparel industry is aligning its priorities to commit to transparency and traceability with urgency. Brand accountability now relies on traceable supply chains, enabling brands to not only identify the origin of raw materials like cotton but also trace the chain of custody as it transitions through the supply chain. This provides oversight of the various supply chain layers and connects brands to cotton producers, allowing them to address issues such as unsustainable production practices, social risks, the economic challenges faced by growers, and inefficiencies in processing.

Due to limited connections between the on-ground workforce and processors, there is often a lack of accessible data. This reduces brands' ability to make informed decisions necessary for achieving sustainable emissions goals. To address this data gap, traceability platforms — both digital and physical — play an essential role in providing the visibility required for effective supply chain stakeholder engagement. Traceability also uncovers issues such as forced or child labor, unsustainable production practices, and poor chemical input management, enabling brands to act swiftly and responsibly.

For such platforms to be effective, they must offer end-to-end lifecycle tracking, deliver real-time data, meet traceability requirements, and provide actionable insights for business decisions. CottonConnect's proprietary TraceBale software stands out as a customizable traceability platform designed for retailer supply chain mapping needs. Built on a bottom-up data gathering model, TraceBale provides granular visibility of the cotton supply chain, from farming groups to the finished product—including the often-overlooked last mile between farms, ginners, and spinners. It even includes processor profiles, allowing brands to understand exactly where their products originate.

TraceBale is also an identity segregation tool, capturing and validating transactions at every stakeholder level, from farmers to ginners and spinners. The tool enables brands to include QR codes on their products, allowing them and their customers to access detailed traceability information from the farm to the end-product. By leveraging TraceBale, retailers can gain a comprehensive understanding of their supply chains, strategically target sustainability improvements, and validate the claims they make about their products and practices.

To date, TraceBale has partnered with 18 retailers, registering 900,000 farmers, processing over 1,250,000 metric tons of sustainable cotton, and mapping the equivalent of 1.4 billion T-shirts.

CottonConnect is also piloting physical tracer technologies to integrate into their digital traceability solutions. The combination of TraceBale's digital traceability with the physical traceability of a DNA marker aims to capture all relevant data, ensuring that marked material completes its journey through the entire supply chain into the final product.

Ms Alison Ward has over 32 years of international experience in sustainability and corporate affairs. Alison is the CEO of CottonConnect, where she leads a team of over 80 employees, impacting the lives of over 560,000 cotton farmers in India, China, Pakistan and Bangladesh. Under Alison's leadership the organization: drives supply chain transparency connecting sustainable fibres from farm to store; focuses on the rights and skills of women in supply chains through pioneering gender programmes; and continues to develop innovations at a farm level. She leads cotton strategies and programmes for global brands and retailers.
Previously Alison worked with Mondelez International and Kraft Foods and was the Global Head of Corporate Responsibility in Cadbury. With a mission to drive scalable change, Alison serves as a Member of the Sustainable Cotton Steering Committee for Textile Exchange. She also sat on the Sustainability Advisory Committee for the London Olympic Games and has been a Coach and Mentor to commercial teams at WWF and the Ethical Trade Initiative.

The Textiles OBSERVER

From Net-Zero to Nature-Positive: Challenges for the Textile and Fashion Industry

By Dr Tanveer, National Textiles University of Pakistan

The world is facing a crisis of unprecedented proportions as we witness the gradual destruction of the planet's natural systems. With the decline in biodiversity, rising pollution, and climate change, it has become imperative to take immediate action to reverse the damage to our environment. The Nature Positive Initiative is a step in the right direction toward restoring the balance between human activities and nature. This initiative is an ambitious attempt to halt biodiversity loss and restore it to full health by 2050, with a significant milestone to be achieved by 2030. The textile industry, one of the major contributors to environmental degradation, can play a crucial role in supporting this initiative by adopting nature-positive strategies.

The Nature Positive Initiative runs parallel to the UN Climate Convention's "net zero" emissions target. It aims to stop nature loss immediately and ensure a world that is positive for nature by 2030. By improving the health, richness, diversity, and resilience of species, communities, and ecosystems, we can stop and reverse nature loss as measured from a baseline of 2020 and put nature back on the path to recovery by 2030. Nature must return to full health recovery by 2050 for ecosystems and natural solutions to continue supporting present and future generations, as well as the diversity of life on Earth.

Nature-positive refers to the process of renewing, replenishing, and fostering biodiversity. For the textile sector, this implies that each crop harvested, each garment produced, and each shipment completed must give back more to the environment than it takes. We must use these resources to survive and flourish on Earth, but we'll have to give back twice as much. The more freshwater we use, the more we must return. Additionally, we must sequester any greenhouse gases that we produce. If we remove one tree, we must plant two as replacements.

Biodiversity encompasses the variety of animals, plants, fungi, and even microorganisms, like bacteria, that make up our natural environment. These various species and organisms work together in complex, web-like ecosystems to maintain, balance, and sustain life on Earth. Biodiversity supports everything in nature that we require for survival, including clean air, food, fresh water, medicines, and shelter.

Since 1970, the average global population of mammals, fish, birds, reptiles, and amphibians has decreased by 69%, according to WWF's 2022 Living Planet Report. About 66% of the ocean's environment and 75% of the land's environment have undergone significant changes. Today, agricultural or livestock production occupies over a third of the planet's land area and nearly 75% of its freshwater resources. What we eat, what we wear, how we power our homes, and how we travel have the largest impacts on the environment.

Textile raw materials and production processes profoundly impact biodiversity. Plant-based and animal-based fibers are ‘renewable’ when they are cultivated or harvested using sustainable methods. Regenerated manmade cellulosic fibers such as viscose, lyocell, and modal are also considered ‘renewable’ when sustainably harvested. Conventional synthetic fibers, including virgin polyester and polyamides, are derived from ‘non-renewable’ petrochemical feedstocks. However, they can also be sourced from pre-consumer or post-consumer polymer or plastic waste through chemical or mechanical recycling. Bio-based synthetic fibers come from ‘renewable’ plants such as corn. The circular model of textile production reduces the need for virgin materials, thereby decreasing the harmful effect on biodiversity.

The AR3T generic guidance for supporting biodiversity suggests Avoid, Reduce, Restore, Regenerate, and Transform strategies for nature-positive textile production:

- **Avoidance** refers to excluding specific materials, land management practices, technologies, and processes that may contribute to biodiversity loss.
- **Reduction** involves changes in product design and production processes to make them more eco-friendly.
- **Restoration** brings degraded natural lands or water sources (like peatlands or watersheds) back to their original natural conditions.
- **Regeneration** includes actions such as carbon sequestration, increasing ecological productivity, and enhancing biophysical functioning.
- **Transformation** entails systemic changes within the textile and apparel industry to avoid biodiversity loss.

Cotton-related activities, such as land clearing, monoculture farming, excessive chemical usage, water abstraction, and irrigation, raise the risk of biodiversity loss and deplete soils, water, and other natural resources. Programs aimed at reducing the negative environmental impact of cotton production include BASF e3, Better Cotton Initiative (BCI), Cotton Made in Africa (CmiA), Fairtrade Cotton, Field to Market®, Intl. Sustainability & Carbon Certified (ISCC), myBMP, Organic Cotton, REEL Cotton, Regenerative Organic Certified (ROC), US Cotton Trust Protocol, Responsible Brazilian Cotton, and Recycled Cotton.

Overgrazing and the introduction of exotic species related to sheep farming for wool production increase the risk of biodiversity loss and depletion of other natural resources. Domestic animal farming can impact biodiversity in other ways, such as habitat degradation, lethal predator control, and limiting movement and access to natural habitats, food, and water. Programs such as Organic Wool, Certified Wildlife Friendly, Regenerative Organic Certified (ROC), Responsible Wool Standard (RWS), ZQ Grower Standard, and Recycled Wool aim to address these concerns.

Land clearing, deforestation, and monoculture activities linked to manmade cellulosic fibers (MMCFs) also contribute to biodiversity loss. MMCF production can threaten wildlife habitats and impose destructive wildlife management practices to mitigate crop damage.

Programs like CanopyStyle, Forest Stewardship Council (FSC), Program for Endorsement of Forest Certification (PEFC), and others focus on mitigating these effects.

The reliance of synthetic fiber production on petrochemicals from fossil fuels raises significant concerns. Reducing dependency on virgin polyester by using post-consumer plastic waste as feedstock (rPET) offers an opportunity to address plastic pollution. Alternatively, biobased feedstocks (e.g., corn or sugar-based bio-synthetics) offer a renewable path forward, provided they are cultivated sustainably.

To achieve true nature-positive production, textile and fashion companies must prioritize strategies ranging from lifecycle assessments, circular business models, and traceable sourcing to eliminating plastic packaging and fostering industry collaborations like Textiles 2030 or the Fashion Pact.

By adopting these practices, the fashion industry can transition from being a contributor to biodiversity loss to a major force for restoration and regeneration.

Dr. Tanveer Hussain is Professor of Textile Engineering and Rector at National Textile University, Faisalabad, Pakistan. He got his PhD in 2004 from Heriot-Watt University, United Kingdom. His current areas of research include: Functional Textiles and Sustainable Textiles. He is Fellow of the Textile Institute, UK and has published more than 150 research papers in peer-reviewed journals. He has been awarded several research grants from the Higher Education Commission of Pakistan and has won various awards including Gold Medal in BSc. Textile Engineering, Bronze Medal from the Society of Dyers and Colourists, UK, and Best University Teacher Award from the Higher Education Commission, Pakistan. Previously, he has served at various positions at National Textile University including Head of Textile Processing Department, and Dean Faculty of Engineering & Technology.

The Textiles OBSERVER

The Importance and Preservation of Fiber Quality through the Cotton Production Pipeline

By Marinus HJ van der Sluijs, Principal Consultant, Textile Technical Services

Executive Summary

In today's highly competitive and incredibly diverse global textile market, product quality has become of paramount importance, with 'value for money' serving as a driving force. In order for cotton spinners to produce yarns that can be converted into high-quality woven and knitted fabrics with little or no difficulty, emphasis continues to be placed on fiber quality, and the maintenance of this quality throughout the entire cotton processing pipeline. To achieve production efficiency, a spinner requires detailed knowledge of the fiber properties in order to control processing performance, operating costs, and the resultant yarn and fabric quality. Cotton is spun on a number of spinning systems, most notably ring followed by rotor and to a lesser extent air-jet, with the most important physical fiber properties being fiber length & uniformity, micronaire, strength, and trash. Color is also recognized by the cotton trade and spinning industry, with other properties such as contamination, stickiness, neps, and seed-coat fragments also considered important. This article aims to highlight the importance of all these fiber properties and how in-field, harvesting and ginning decisions can impact fiber quality and processing performance.

Meeting the Challenges

Cotton, being a natural agricultural product, differs widely from growth to growth, crop to crop, lot to lot, bale to bale, within a bale, and even fiber to fiber. As cotton is currently produced in more than 60 countries with more than a third exporting, spinning mills have been forced to blend cotton from various parts of the world since the early 1800s. Fibers are generally blended before the carding process by laydown selection, tuft blending during the opening and cleaning process, the use of single or multiple blending chambers, and blending during multiple drawing passages. The blending process starts with the selection of an appropriate number of bales from lots in the warehouse. Lots are generally segregated by consignments and quality parameters, and are chosen to ensure continuity of supply, avoid batch to batch variation, provide cost saving on raw materials, utilize discounted cotton, and produce special effects. The number of bales used in a bale laydown varies and is very much dependent on the quality required and practical considerations, such as processing time per lot, floor space, production capabilities, and the mixing power of downstream machines.

In view of this — and the important effect which variations in fiber properties have on processing performance, cost, and product quality — it is of crucial importance that such variations in fiber properties be determined and quantified. At first this was conducted by

using cotton standards for the subjective classification of color, trash, and preparation (degree of smoothness or roughness of the cotton sample).

However, with the increasing demands of modern spinning, the cost of raw material — which contributes 50% to 70% to the total yarn manufacturing costs — and the increasingly competitive global market, there was a need to rapidly and accurately measure those cotton fiber quality parameters that actually affect processing performance and quality in a cost-effective way. This led to the development of numerous, rapid methods with the culmination of high-volume automatic testing systems. These systems, termed High Volume Instruments (HVI™), provide objectively measured information to either supplement or replace the traditional method of cotton classification. Other instruments such as the Advanced Fiber Information System (AFIS), Textechno Favimat, and Cottonscope are also used by breeders and spinners to further quantify fiber properties.

There are in essence two cotton types grown worldwide with Upland cotton (*Gossypium hirsutum* L.) the most popular followed by Extra Long Staple (ELS) cottons *(Gossypium barbadence* L.). This article aims to highlight how in-field, harvesting, and ginning decisions can impact fiber quality and processing performance of mainly Upland cotton.

Fiber Properties

As cotton is grown in many countries, it is unsurprising that the quality and quantity of the fiber produced varies greatly and is largely due to variety selection, environmental conditions, and management practices including harvesting and ginning methods. Indeed, fiber quality is at its best after the boll has opened and prior to any subsequent weathering, harvesting and ginning. That being said, there is essentially no ‘high’ or ‘low’ quality cotton, but rather, only ‘good’ quality that meets prescribed requirements in terms of performance, characteristics, price, and the intended use.

In terms of the contribution of fiber properties to the price, on average at 30% color has the highest contribution, with some companies prepared to pay 0.38 to 1% more for cotton that was 1% less gray and 0.13 to 0.63% for cotton that was 1% less yellow, i.e., brighter. Color is followed by cleanliness/trash at 23%, micronaire at 22%, length at 20%, and strength at 5%.

Color

The color of commercially grown cotton varies from white to creamy to yellow, and is mainly determined by the cultivar and growing conditions, such as temperature, rainfall, frost, insects, and fungi. Staining, through contact with soil, grass or other parts of the cotton plant, moisture during harvest, and ageing during prolonged storage can also deteriorate the color of cotton.

Cotton color has little effect on the processing performance and quality during spinning and fabric manufacture — provided that the color has not been compromised by microbial decay, which may also have an effect on the length and strength of the fiber. However, as textile mills process cottons of different grades and origins, the control of fiber color is essential, as color differences may affect dyeing and finishing results. The process of bleaching, prior to dyeing, is often able to reduce or even eliminate color differences present in the raw cotton.

Cotton is still largely bought and sold on the basis of a cotton classer's subjective assessment of grade relative to a prepared physical sample of the said grade. In awarding a classing grade, the classer will assess the sample's color, visible trash (leaf grade) and preparation (degree of smoothness or roughness of the cotton sample) relative to the appearance of a physical grade. The physical sample grades were established by the United States Department of Agriculture (USDA) in the early 1900s to eliminate price differences between markets, provide a means of settling disputes and to make the grower more aware of the value of their product. Nowadays, USDA physical grade boxes and the qualities they represent are globally accepted and routinely used to trade cotton worldwide — the only exception being that some cotton is sold on physical grades and shipper types represented by actual samples, which are used for reference purposes against the shipped cotton.

The color grading of Upland cotton considers both major and minor differences in color. Major color differences occur between the five classes of 'white', 'light spotted', 'spotted', 'tinged' and 'yellow' stained cotton, chiefly due to increasing degrees of yellowness across the five classes. Within each of these classes the reflectance or whiteness of the fiber is assessed across another eight levels from 'Good Middling' through to 'Below Grade'. There are currently 25 official physical color grades for Upland cotton and five grades for below grade color (see Table 1).

Table I. Official Color Grades of Upland Cotton

Designation		White	Light Spotted	Spotted	Tinged	Yellow Stained
Good Middling	GM	11	12	13	-	-
Strict Middling	SM	21	22	23	24	25
Middling	M	31	32	33	34	35
Strict Low Middling	SLM	41	42	43	44	-
Low Middling	LM	51	52	53	54	-
Strict Good Ordinary	SGO	61	62	63	-	-
Good Ordinary	GO	71	-	-	-	-
Below Grade	BG	81	82	83	84	85

Due to the subjective nature and inconsistency of manual classing, the need for objective measurement led the USDA in the 1970s to consider the feasibility of color measurement by instrument. With the development of colorimeter technology and then the incorporation of colorimeters into HVI lines, the classification of color by instrumentation became feasible. Objective measurement of cotton fiber color is defined in terms of the Nickerson-Hunter model, which describe color in terms of greyness (Rd) and yellowness (+b).

Refinements in instrumentation and calibration techniques have led to USDA's adoption of HVI-measured color grades for all US cotton since the early 2000s, with the world industry playing catch-up since that time.

Trash

The trash found in cotton typically refers to parts of the cotton plant such leaf fragments, pieces of stem, bract, bark, seed-coat fragments (parts of the seed-coat that have been broken off during mechanical processing) and motes (immature seed with short immature fiber attached), which are incorporated into the seed-cotton during harvesting and largely remain with the cotton through to the spinning mill. Trash also includes grass as well as dirt and sand, which are generally referred to as extraneous matter. The amount of trash present in seed-cotton is very much dependent on the variety, crop management (including nutrition and defoliation), harvesting method and set up as well as the ambient air conditions (temperature and relative) of the field. The amount of trash in seed-cotton can vary from 1% to 5% for cotton harvested by hand, to between 5% and 10% for spindle and between 10% and 30% for stripper harvested cotton. For this reason, gins that process mechanically harvested cotton require more cleaning and drying equipment to remove this trash. The fact that the grade still plays a crucial role in determining the price paid for cotton often forces gins to over-clean the cotton to achieve a high grade — which results in a higher price being paid for the cotton lint and therefore a better return for the grower. Unfortunately, this is often to the detriment of the physical fiber quality, as this can adversely affect fiber length and uniformity, increase nep and short fiber content which will affect the textile performance and value of the cotton. Ginning represents, in essence, a compromise between fiber trash and fiber quality.

As indicated previously, trash, or 'leaf grade', is still largely determined by subjective assessment against physical and descriptive grades based on the USDA's Universal Grade Standards. Upland leaf grades, determined by a human classer, are identified by the numbers 1 (low) through to 8 (high), while for Pima, the leaf grades are identified by the numbers 1 (low) through to 6 (high) .

In addition to the number of particles, the size of trash particles in ginned lint is also of considerable concern to spinners. In general, spinners prefer the trash particles to be large so that the particles can easily be removed with standard cleaning equipment at the mill. Small trash particles, commonly referred to as 'pepper trash', are more difficult to remove. Pepper trash causes excessive fiber loss and creates processing performance and yarn quality issues in rotor spinning. The presence of bark, seed-coat fragments, and grass are also a serious problem, as their fibrous nature makes it difficult to separate from the cotton fiber. Their incorporation into finished fabric can result in costly claims to the yarn or fabric seller. Table 2 provides general trash classifications according to size.

Table 2. Interpretation of trash values

Description	Size in µm
Trash	>500
Dust	<500
Fine-dust	<50
Micro-dust	<15

Extraneous Matter

Extraneous matter is determined by the human classer and is defined as any substance in a cotton sample that is not cotton fiber or leaf material. When extraneous matter is prevalent in a sample, a notation will be made by the classer in the classification data for that cotton sample. In essence extraneous matter are contaminants including bark, grass, seed-coat fragments, spindle twist, dust, oil, and plastic which will be touched on in the contamination and seed-coat fragment sections.

Preparation

Preparation is determined by the human classer and is a measure of the degree of roughness or smoothness of the ginned cotton lint. This is considered an arbitrary and outdated categorization, as the appearance of a sample is very much dependent on harvesting and ginning methods which can produce differences in appearance and preparation and are not necessary a reflection of the fiber quality — case in point being the difference in appearance of roller- and saw-ginned cotton.

Micronaire

Micronaire, a combination of fineness and maturity, has a substantial influence on processing performance in terms of ends down, processing waste, yarn and fabric quality, dyed fabric appearance as well as end-use. In order to spin a reasonable quality ring-spun yarn, a spinner needs at least 80 fibers in the yarn cross section, more than 100 fibers in rotor (open-end) yarn cross-section and more than 75 fibers in an air-jet spun yarn. To produce light weight fabrics, fine count yarns are required, which means that fine (and long) fibers are required to obtain the minimum number of fibers in the cross-section. Excessive micronaire variation can lead to streakiness or barré due to differences in dye absorbency and retention and hence the levels within a laydown or blend should not vary excessively (≥ 0.2 units). Surveys conducted worldwide of spinning mills, found that 78% of the respondents rated micronaire as a major cause of defects and deficiencies during yarn manufacturing.

Micronaire is one of the most challenging fiber quality parameters to manage, as it is subject to penalties for being either too high or too low. Table 3 provides information of worldwide classification and description for interpreting micronaire values. The table shows that the base grade falls in the range of 3.5 to 4.9, with the premium range 3.7 to 4.2. Any cotton with micronaire below base grade will be severely discounted as it is considered to be immature,

whereas cotton above base grade is not as severely discounted because it can be used to produce lower-quality coarse yarns for denim.

Table 3. Micronaire classification

Micronaire Range	Group	Description
≥5.3	G7	Very Coarse
5.2 – 5.0	G6	Coarse
4.9 - 3.5	G5	Base Grade
3.4 – 3.3	G4	Immature
3.2 – 3.0	G3	Very Immature
2.9 – 2.7	G2	Very Immature
2.6 – 2.5	G1	Very Immature
≤ 2.4	G0	Very Immature

One of the most important decisions a grower makes in terms of yield and quality is the selection of variety, which accounts for 25% of variation in micronaire. Fifty one percent of the variation in micronaire can be attributed to weather and management, with temperature accounting for 21% of the variability in micronaire.

Length and Length Uniformity

Fiber length will determine the spinning system to be used (i.e., ring, rotor, or air-jet), the specifications in terms of drafting roller distances, yarn count and twist, as well as processing speeds. Excessive fiber length variation and an associated increase in short fiber content (fibers shorter than 12.7 mm or 0.5 inch) will result in increased waste and adversely affect processing performance (i.e., ends down, fly, comber noil, etc.) and a deterioration in yarn quality, in terms of yarn strength, hairiness, and evenness, specifically ring-spun, and subsequently fabric quality, including handle and luster.

Fiber lengths of Upland cotton range from as low as 15 mm (0.59 inch) to 32 mm (1.26 inch), with ELS cotton ranging from 32 mm (1.26 inch) to 51 mm (2.01 inch).

Length uniformity is the ratio between the mean length (ML) and the upper half mean length (UHML) of the fibers and expressed as a percentage. If all the fibers in a bale were the same length ML and UHML would be similar, and the uniformity would be 100%. However, due to natural variation and processing length uniformity is always less than 100%, with values above 85% considered high, 80 to 82% as intermediate and below 79% as low length uniformity. As intimated above length uniformity is perhaps even more important than fiber length as variations in length can affect the evenness and strength of the yarn as well as processing performance. Length uniformity is also related to short fiber content (SFC%), with low uniformity values likely to have high SFC%. SFC% is of concern to textile manufacturers because it relates directly to the amount of waste extracted, noil removed

during combing, and also has a detrimental effect on the quality of yarn and fabric. Typical SFC values range from 4% to 12% in ginned lint but are much lower in un-ginned lint.

Fiber length is largely a genetic trait and varies considerably across different cotton species and varieties. Length and length distribution are also affected by agronomic and environmental factors during fiber development, and mechanical harvesting and ginning. Gin damage to fiber length is known to be dependent upon variety, seed cotton moisture, trash content, moisture during ginning and field exposure.

It is also worth mentioning that fiber length distribution presents a serious challenge, in most other natural fibers, such as wool and mohair, but seldom in man-made fibers.

Strength

The ability of cotton to withstand tensile force is fundamentally important in the processing of cotton. Yarn strength correlates highly with fiber strength, and good tensile strength specific to fiber fineness, is an important factor in resisting damage through the gin, particularly through the lint cleaner. Table 4 provides general classifications of strength values. Fiber strength is highly dependent on the genetics, although environmental conditions can also have a small effect.

Table 4. Interpretation of strength values

Descriptive Designation	Strength (grams per tex)
Weak	23.0 & below
Intermediate	24.0 – 25.0
Average	26.0 – 28.0
Strong	29.0 – 30.0
Very strong	31.0 & above

Contamination

Any foreign matter found entwined within or stained onto cotton fiber, yarn or fabric is considered contamination. Contamination arises from foreign matter being incorporated into the bale because of human interaction during harvesting, ginning and baling, and even extending into the mill. To quantify the type and amount of contamination found in cotton the ITMF instigated regular (biannual) contamination surveys of cotton users (mills) to measure the amount and type of contamination found in world cotton crops.

Data suggests that the major source of contamination in all cotton bales continues to be organic matter, such as leaves, feathers, paper and leather. The next most prevalent contaminants are pieces of fabric and string made from cotton, woven plastic, plastic film and

jute/hessian, followed by sand and dust and then by oily substances/chemicals and inorganic matter, such as rust and metal.

As one would expect, the degree of contamination varies widely from region to region and is related to different farming, harvesting and ginning practices – with no cotton being 100% contaminant free. It is also noted that cotton that is mechanically harvested generally has less contamination as there is less interaction between humans and the cotton during harvesting and ginning processes.

Cotton passes through many processes in a spinning mill on its way to being converted into yarn. Whilst larger pieces of contaminant are more likely to be removed, each mechanical process reduces the size of most of contaminants into many fragments, particles or fibers as the case may be. These smaller pieces and fragments can remain undetected through the mill and only become noticeable quite late in the conversion process, e.g., as yarn, in an end-break, or more costly, when finished fabric or garment is inspected before sale. When contamination is discovered by the retailer or consumer the cost to the manufacturer becomes very high, in terms of the order and longer-term reputation. The loss of reputation can cause irreparable harm to all the relationships back down the supply chain to the growers.

Spinning mills have for many years lodged complaints and produced evidence of contamination found in cotton bales they have bought. Indeed, there is a feeling amongst mills that contamination is increasing and that the cotton trade (growers through to the shippers) has done little to eliminate or reduce the incidence of contamination. As a consequence, the more quality conscious spinners have defined allowable levels of contamination and developed a range of screening protocols in order to assess the contamination risk of the purchased cotton . Through the practical experience of mill staff and industry hearsay, cotton purchases from origins that are known, or perceived to be contaminated, are either avoided or the use of that growth minimized. Once an origin has achieved a reputation for contamination, the likelihood of achieving base world market prices are slim and the cotton from that origin is then usually heavily discounted.

Contamination represents a significant cost to spinning mills and thus it is important to detect and eliminate contamination as early in the process as possible. This has led to the development and implementation of a range of methods and behaviors to detect and remove contamination from the mill process. The first step, and the most logical, is to prevent/avoid or minimize the amount of contamination in entering the production process. This can be achieved by educational programs to growers, harvesters and ginners that provide information on preventing contamination of seed-cotton and lint in the field and at the gin. These programs need to be regularly undated and presented to ensure that awareness is kept high. The key message in these campaigns is that negative reputations around contamination can lead to huge losses to the country/region concerned .

Contamination detection and removal systems for mills have been applied in gins since the early 2000s but to date, the systems or the sensors they employ, have not worked well in the higher volume and physically harsher ginning environment. Moreover, there is no immediate incentive to the grower or ginner to mitigate the level of contamination in baled cotton despite the poor reputation that follows. A more recent solution has been the installation of a

camera in the module feeder that automatically detects and alerts gin operators to the presence of large pieces of contamination caught on the module beaters.

As contamination represents a significant cost to spinning mills, the implementation of methods ranging from manual removal to detection and removal by machine, to cope with contamination are common, particularly in mills using cotton from different origins.

In countries where labor costs are comparatively low, mills will often employ large numbers of people to patrol the bale laydown and remove contamination from bales before the cotton is fed into the blow room line by the bale opener. A small number of spinning mills manually check and remove contamination from every bale of cotton before it is processed. This manual sorting is either done directly from the bale or the bale is first opened using a bale opener with a spiked lattice to open the cotton prior to manual sorting. This approach is however very time consuming, labor intensive, costly and generally only relatively large pieces of contaminants, e.g., larger than 1 cm^2, are removed.

There are several foreign matter detectors available on the market which can be installed at the different stages of the spinning process. The inclusion of metal detectors in blowrooms has been a standard feature for many years. Careful control of waste recycling and maintenance in the spinning mill is also paramount to avoid the accidental introduction of contaminants and foreign fibers to the process.

Contamination detection and removal systems installed in the blowroom prior to carding are common. In most instances when a contaminant is detected, it is measured (registered) and then mechanically removed via an alternate material flow outlet. Even though there are estimated to be over 5000 systems installed worldwide, they are expensive and there are issues with their capacity and the amount of good fiber that is extracted when contaminants are ejected. It has been stated the systems remove only around 65% of contaminants and are dependent on the degree to which the fiber is opened prior to detection.

In addition to the foreign matter detectors installed in the blowroom, there are devices on the market that can be added to the creels of drawing and lapping machines, which detect foreign fibers (of a different color) and stop the machine for removal, by the operator, of the contaminant.

Traditionally, yarn clearers were used to detect and remove unwanted and objectionable faults from yarn with modern clearers now also able to detect and remove foreign matters. These clearers are now sensitive enough to remove fibrous material ranging from 1 cm^2 down to 0.001 cm^2 in size. The types of contamination and the efficiency of removal depend on the sensors employed and the yarns they are used on. The disadvantage of these systems is their expense and sensitivity to a large number of contaminants, which in extreme cases results in loss of production, increased processing and labor costs, reduction in yarn quality and increased waste. Spinners have also stated that these systems only remove 80% to 85% of contaminant.

There is the possibility of removing contaminants manually from the fabric; however, this is very time-consuming and expensive. The difficulty of removing the contaminant without damaging the fabric depends on the type of fabric (loose vs. tight structure) and yarn twist, amongst a range of other attributes. Ultraviolet lights can also be installed in the packing and

inspection departments to detect chemical/oily substances and foreign fiber such as polyester and other man-made fibers that fluoresce.

There is no doubt that all the methods and approaches discussed reduce the risk of claims due to contamination, but do not guarantee the yarn or fabric produced will be totally free of contamination. Added to this is the fact that there are no international standards for acceptable levels and size of contaminants in fabrics. It has been suggested that if the rate of contamination in cotton bales is less than one gram/ton, and all other remediation controls are in place, the contamination in fabric and garment would be minimal.

Stickiness

Cotton stickiness, when it occurs, can present a major problem in terms of textile processing performance and cost and product quality. Because of a reputation for stickiness, some countries have difficulty selling their cotton, and must offer discounts of between 5% to 30%. In fact, sticky cottons, caused by honeydew contamination for example, are impossible to process on their own into yarn of acceptable quality. Furthermore, the costs for controlling stickiness in the field can be extremely high.

The most common and problematic causes of stickiness in practice, even today, are those due to excess sugars related to insect secretions, notably aphids (*Aphis Gosypii Glov.*) and whitefly (*Bemesia Tabaci Genn.*), referred to as honeydew (insect honeydew), these being responsible for 80 to 90% of stickiness problems. In addition, a black sooty mold can also grow on honeydew, darkening the lint and adversely affecting grade. Physiological or plant related stickiness, originates from highly immature cottons (which can contain up to about 0.9% sugars) and plant sap, but also from crushed seeds, moats, seed fragments and fine leaf particles, as well as excessive levels of cotton wax.

The main problem related to cotton stickiness is that of the sticky deposit, or residue, adhering to any machine part or surface encountered by the cotton along the processing pipeline, causing an accumulation of fibers (and even dust or grit), during the ginning and spinning process and even during classing.

In extreme cases, stickiness can also affect harvesting with the spindle type harvesters, as sticky deposits will accumulate and clog the spindles causing blockages.

Roller gins, used mainly to gin ELS cottons, are more susceptible to stickiness due to their design, with the ginning process reliant on friction, and a build-up of sticky spots on the ginning roller and the stationary knife will result in a decrease in ginning efficiency. In terms of saw gins used on Upland cottons, sticky deposits can clog the gin and disrupt the baling process due to accumulation of lint on the lint slide of the battery condenser. These disruptions can reduce gin production in bales/hour resulting in longer and more expensive ginning seasons, due to higher labor costs and additional spare parts, as saws and blades need to be replaced more regularly.

Sticky deposits can also cause issues during cotton classification, with deposits on the combs, used in HVI instruments, resulting in incorrect and inaccurate fiber measurements.

Cotton with high incidence of stickiness will result in a gradual build-up of sticky deposits on processing machinery, which then disrupts and/or interferes with the smooth flow of the

cotton during processing, leading to machine stoppages (notably spinning ends down) and/or inferior quality products, particularly yarn. Sticky cotton will be first noticed on the calendar rollers of a scutcher or carding machine and then during the drawing, roving, and spinning processes, where creel drives and more typically roller lapping is experienced.

It is clear that the incidence of stickiness varies considerably and is very much dependent on the growing conditions during the season as well as the farm practices employed, specifically the degree of nutrition in terms of farm hygiene, biosecurity, nitrogen fertilizer and late irrigation, timing of planting and field selection, limiting availability of attractive crops. the integrated pest management practices adopted in terms of maintaining beneficial numbers, harvest aid chemicals for mechanical harvesting, variety selection. One of the major problems associated with the prevention and treatment of stickiness, is that, due to its isolated and random nature, it is very difficult to effectively detect sticky cottons, until the problem manifests itself during the processing of the cotton. Some practical solutions include:

- Best to eliminate at the source — ie, during cotton growing (insect management)
- Minimize seed-coat fragments during ginning and ensure efficient cleaning during opening.
- Avoid cottons with high levels of seedcoat (immature) fragments.
- Avoid low micronaire (immature) cottons.
- Blend small proportions of sticky cottons with non-sticky cottons.
- Process at lower humidity (< 50% RH) and temperature. This could, however, lead to problems with static and excessive fiber breakage during processing
- Reduce pressure on card crush rollers.
- Regular cleaning of rollers
- Coating rollers with iodine or another suitable substance

Neps

A nep can be described as a tightly tangled, knot-like mass of unorganized fibers. It has been stated that nep formation is inherent in short staple spinning, irrespective of fiber type and that neps in yarn are an unavoidable phenomenon, which can be controlled but not totally eliminated.

Neps are formed by the mechanical stresses applied to the fiber all along the processing chain from harvesting but particularly during ginning (lint cleaning) and opening and cleaning in the spinning mill. The quality and value of a finished garment is affected by the number of imperfections contained in the fabric. Neps adversely affect the appearance of cotton yarns and subsequently the fabric made from them. Neps are usually associated with lower yarn strength, higher ends down in spinning and less uniform yarn. Neps result in short, thick places in the yarn, resulting in an uneven fabric appearance and weak places in yarns causing a loss in spinning efficiency as well as resulting in stoppages and fabric defects during weaving and knitting.

The appearance of dyed or printed fabrics is negatively influenced by the presence of neps, which often comprise immature fibers. Immature fibers absorb dye and reflect light differently to mature fibers due to relatively thin secondary cell walls and lack of cellulose. They appear as white spots or flecks on finished fabrics and although noticeable when fabrics

are dyed lighter colors, are particularly noticeable on fabrics dyed to dark shades. Their appearance can cause fabrics to be downgraded or rejected, as there are no practical means of covering or removing the imperfections once present in the fabric. There are currently no industry standards for an acceptable number of neps per cm^2 of finished fabric nor is there a consensus on nep size or classification.

Cotton lint with a high nep content, is more prone to nep formation during processing. The question that arises is what nep levels does the textile industry accept or aspire to? There seems to be a general consensus that the nep content in short and medium staple cotton lint should not exceed 250 neps/gram, but preferably below 200 neps/gram, and even as low as 150 neps/gram.

Fiber properties that have an effect on the formation of neps include fineness (micronaire), maturity, length (including short fiber content) and strength, with micronaire and maturity having a large influence on nep formation. 'Finer' micronaire cotton fibers tend to form neps more easily than coarser fibers, because the former are more easily bent, buckled and entangled during mechanical manipulation because of their relatively low longitudinal rigidity.

Seed-coat fragments

It has been stated that practically all ginned lint contains seed-coat fragments, and that the main source is the chalazal end which is generally not fully developed or is structurally weak, with fibers in this area possibly immature due to varietal and environmental factors, and torn off with a piece of seed instead of being broken off . This leads to the creation of seed-coat fragments (SCF) when the fiber is separated from the seed, which consist mainly of pieces of the chalazal or rounded end of the seed, as well as motes (whole immature seeds) which broke during ginning. Medium sized motes (1 to 3 mm in width and 3 to 5 mm in length), having fibers of medium length attached, contribute to SCF, due to them becoming fractured during ginning.

The number of SCF in ginned cotton can vary by as much as 50%, with the major factors contributing to their occurrence were cotton variety, crop year and timing of harvest . It has further been stated that SCF are becoming a bigger issue, due to increased seed-cotton cleaning during ginning and the fact that spinners require more uniform fibre, which is free of foreign matter. Not only do SCF cause spinning end breakages, but they also cause a deterioration in yarn appearance and increase production costs, being virtually impossible to extract from the bulk of raw cotton, except at the combing process, because of the tuft of fibers attached to the seed-coat. Hence, they are generally incorporated into the yarns as a nep. SCF appear as dark specks on the surface of dyed fabrics and are generally surrounded by immature fibers of lighter color, which reduce the quality of the final product. It is for this reason that spinners dread SCF and there is a perception amongst spinners that SCF is a serious and increasing problem.

As would be expected, rotor-spun yarns tend to be less affected by SCF than ring-spun yarns. This is mainly due to the fact that the opening roller of the rotor spinning machine removes a significant amount of trash and SCF from the input sliver and also the structure of the yarn tends to hide SCF within the body.

There seems to be a general consensus that SCF content in short and medium staple raw cotton lint should not exceed 30 neps/gram, in fact, but preferably below 20 neps/gram, and even as low as 10 neps/gram.

Other

There are other fiber properties that are perhaps considered less significant but are gaining in importance.

Utilization/Realization

As raw materials make up more than half the cost of yarn production the utilization in terms of input vs output is important and should be closely monitored and controlled. As the waste extracted during the cleaning, carding and combing processes do contain a large proportion of good and reusable fibers, the installation of recycling systems to recover these fibers is strongly advocated.

Elongation

As part of the strength measurement, elongation is also measured, although the value of this parameter in the market is less understood. No premium or discount is paid on the basis of this property and only a small number of high-end spinning mills are starting as well as plant breeders are starting to pay attention to this property.

Maturity and Fineness

As mentioned previously, micronaire is a combination of maturity (the degree of the secondary wall development) and fineness (linear density), with low micronaire cotton severely discounted. However, low micronaire does not necessarily imply that the fiber is immature, it could also be mature and fine which would be valuable to fine count spinners. This is particularly true for ELS cottons which are generally finer than Upland cotton. There are direct methods to determine maturity and fineness, but they are extremely labor intensive, costly and subjective. Therefore, instruments have been developed to separate maturity and fineness, but these are currently too slow to be accepted by the industry and are mainly used for research purposes.

Conclusion

Cotton is a global commodity that is either grown or used in virtually every country in the world and is traded in the form of fiber, yarn, fabric or finished goods. However, with increasing competition from manmade fibers (most notably polyester) the pressure to make improvements in the cotton production pipeline has increased. There is no doubt that to produce a yarn of acceptable quality and processing performance, at a reasonable cost; requires a fundamental knowledge and understanding of the fiber properties. Important fiber properties include length & uniformity (including SFC%), micronaire, strength, trash, color, contamination, stickiness, neps and seed-coat fragments. Most of these fiber properties are influenced by infield decisions in terms of variety selection, management practices, environmental conditions as well as harvesting and ginning preferences and as such should be managed appropriately to minimize variation. This will ensure maximum return to the grower and allow the spinner to process the fiber with minimum difficulty at an acceptable processing performance producing the required yarn quality.

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With more than 44 years of experience in textiles and fiber processing, Dr. René has extensive commercial knowledge of all facets of the cotton production pipeline from field to fabric, specializing in yarn manufacturing and quality. Amongst others, he is a certified quality expert and is the current chair of ICAC's Committee on Commercial Standardization of Instrument Testing of Cotton (CSITC). He is also an executive member of the Australian Cotton Ginners Association and the ITMF International Committee on Cotton Testing Methods. Marinus is also a member of the ITMF Spinners Committee and the Cotton Classing Association of Australia, and is the Australian fiber quality technical expert. He has authored many articles and technical reports and has been invited to present at numerous domestic and international conferences. He has managed to secure a large and diverse number of projects, service agreements, and commission cotton textile processing work. He has won many awards, including the prestigious Australian Cotton Researcher of the Year Award.

The Textiles OBSERVER

Textiles in ICAC Member Countries

By Kanwar Usman, ICAC Head of Textiles

EDITOR'S NOTE: *This article is a summarization of the first-ever "Report on Textiles in ICAC Member Countries," a massive, 220-page resource that will be updated and released in Q1 of each year. To see the Report, please click here.*

The global textile trade has undergone a profound transformation over the past two decades, expanding from $482 billion in 2004 to $882 billion in 2023, with a peak of $958 billion in 2022. This remarkable growth underscores textiles as a cornerstone of global commerce, influencing economies, employment, and industrial development worldwide. Within this landscape, ICAC member countries hold an unrivaled position, contributing 55% of global GDP and labor force of over 1.5 billion people. These nations are not just key suppliers but also major consumers, accounting for 47% of the world's textile exports ($452 billion) and 58% of global textile imports ($550 billion), a testament to their deep-rooted integration into the global textile value chain.

However, the industry is at a critical juncture. Sustainability mandates, shifting trade dynamics, and the escalating dominance of synthetic fibers are redefining competitive landscapes. Recognizing this evolving reality, the International Cotton Advisory Committee (ICAC), an intergovernmental body representing 24 member countries, including the European Union, has expanded its scope beyond cotton to encompass the entire textile value chain. This strategic shift marks the inception of ICAC Textiles, a pioneering knowledge hub designed to connect governments, industry leaders, researchers, and investors to shape the future of the textile industry through innovation, sustainable policies, and enhanced competitiveness.

At the heart of this transformation is a series of groundbreaking initiatives, each aimed at reinforcing ICAC's leadership in driving the next era of textiles. Among these initiatives, the Cotton Innovation Platform (CIP) stands as a flagship endeavor, redefining how cotton competes in an era increasingly dominated by synthetics. As competition from synthetic fibers intensifies, the Cotton Innovation Platform (CIP) is designed to position cotton as a high-performance, sustainable fiber, unlocking new opportunities in advanced textiles, circularity, and next-generation applications. A pioneering initiative by ICAC Textiles, CIP aims to bridge the gap between cutting-edge research and industry adoption, ensuring cotton's competitiveness in a rapidly evolving global market.

At its core, CIP is structured around four transformative pillars:

Showcasing Cutting-Edge Research:

The CIP web portal will serve as the world's leading knowledge hub for cotton innovation, featuring breakthrough research from premier institutions, textile scientists, and industry

pioneers. From smart fabrics and technical textiles to medical applications, high-performance sportswear, and biodegradable packaging, CIP will highlight how cotton is evolving to meet the demands of a dynamic textile market.

A Strong Presence at Global Events:

CIP will have a dedicated presence at major international textile and apparel exhibitions, showcasing next-generation cotton-based innovations. Through interactive displays, live demonstrations, and curated industry collaborations, the CIP Pavilion will attract investors, buyers, and brands, reinforcing cotton's position as a fiber of the future.

Plenary Sessions for Unparalleled Industry Exposure:

At the ICAC Plenary Meeting, CIP will be in the spotlight, featuring a dedicated session that brings together global brands, sustainability leaders, policymakers, and innovators. This platform will provide maximum visibility for research and emerging technologies, ensuring that the cotton sector remains at the forefront of sustainability and competitiveness.

Collaboration with Textile Universities for Future-Ready Innovation:

CIP will establish strategic partnerships with textile universities worldwide, fostering academic-industry collaboration to align cotton research with market demands. By engaging students, researchers, and professionals, CIP will drive real-world applications of scientific advancements, ensuring cotton continues to lead in innovation, functionality, and sustainability.

By integrating research, technology, and global collaboration, CIP is redefining cotton's role in textiles, securing its future as a high-performance, sustainable, and economically viable fiber in a competitive landscape.

In an increasingly interconnected and competitive textile landscape, access to accurate, transparent, and strategic information is crucial for growth, investment, and policy development. To meet this need, ICAC has developed the ICAC Member Countries Profile, a comprehensive digital platform designed to serve as the go-to resource for governments, investors, buyers, and industry leaders. This initiative offers a structured, data-driven approach to understanding profiles, market insights, trade and investment frameworks, and sustainability initiatives. It consolidates key information on production capacity, key players, market trends, and economic potential, offering a centralized repository of import/export regulations, trade agreements, investment policies, and economic indicators to enable seamless global transactions and policy alignment.

This first-of-its-kind initiative also tracks the progress of each country in circularity, traceability, and sustainable manufacturing, ensuring alignment with global environmental and social governance standards. Additionally, the platform serves as a hub for knowledge exchange, sharing best practices, policy innovations, and strategies, allowing member countries to learn from each other and adapt proven solutions to their industries. By consolidating and simplifying access to vital industry intelligence, the ICAC Member Countries Profile empowers nations to attract investment, expand trade, and strengthen their economic positioning by showcasing their competitive advantages to potential investors, trade partners, and buyers.

The global textile industry is at a pivotal moment, where investment, innovation, and sustainability are redefining competitiveness. Recognizing this, ICAC is spearheading the Global Cotton & Textiles Investment Summit, an initiative designed to connect governments, industry leaders, and investors in a strategic effort to strengthen the cotton-textile value chain. As ICAC member countries contribute nearly half of global textile exports and more than half of textile imports, they play a defining role in shaping global trade. However, while many cotton-producing nations hold vast potential for value addition, investment in textile manufacturing remains underdeveloped. This summit will serve as a catalyst to bridge that gap by facilitating sustainable investment, driving trade expansion, and accelerating technological advancements.

The summit will provide an exclusive platform where ICAC member countries can showcase their textile industries, investment frameworks, policy incentives, and infrastructure capabilities to attract investors and buyers. Key industry players, including spinning mills, fabric manufacturers, garment producers, machinery suppliers, global brands, and sustainability organizations, will engage in high-level discussions, investment presentations, and curated networking sessions aimed at fostering strategic partnerships. With a focus on sustainable development, market linkages, and cutting-edge innovations, the event will position ICAC member countries to compete effectively in an evolving global textile landscape.

To maximize impact, ICAC will offer dedicated support to its member countries, assisting in the preparation of strategic textile visions, identifying high-potential development areas, and crafting investment-driven documents that highlight their competitive advantages. By equipping countries with robust investment strategies and tailored proposals, ICAC aims to strengthen their ability to secure meaningful partnerships and capitalize on emerging opportunities in textiles.

ICAC is actively working to organize this first-of-its-kind summit in the first half of 2026 and is currently in discussions with potential host countries. Beyond serving as an investment platform, the event will be a transformational opportunity for ICAC member nations seeking to move up the textile value chain, attract capital inflows, and expand their global market presence. It will also reinforce ICAC’s role in bridging the investment gap, supporting economic growth, and positioning cotton-based textiles as a sustainable, high-value industry in international trade.

Further enhancing engagement, the ICAC Standing Committee has approved the nomination of a Textile Focal Person from each member government. This initiative will establish a dedicated global Textiles Network, fostering policy exchange, industry collaboration, and long-term textile sector development.

The textile industry has long been a cornerstone of global economic activity, serving as a catalyst for industrialization, employment generation, and trade expansion. While traditionally associated with clothing and home furnishings, textiles now permeate almost every sector, from healthcare and automotive to construction and aerospace. The evolution of technical textiles has been particularly groundbreaking, driving innovation in areas such as medical advancements, high-performance infrastructure materials, and even space exploration. The industry's deep connection to agriculture, particularly through natural fibers

like cotton, further underscores its significance, while advancements in smart textiles are redefining the interface between traditional manufacturing and cutting-edge technology.

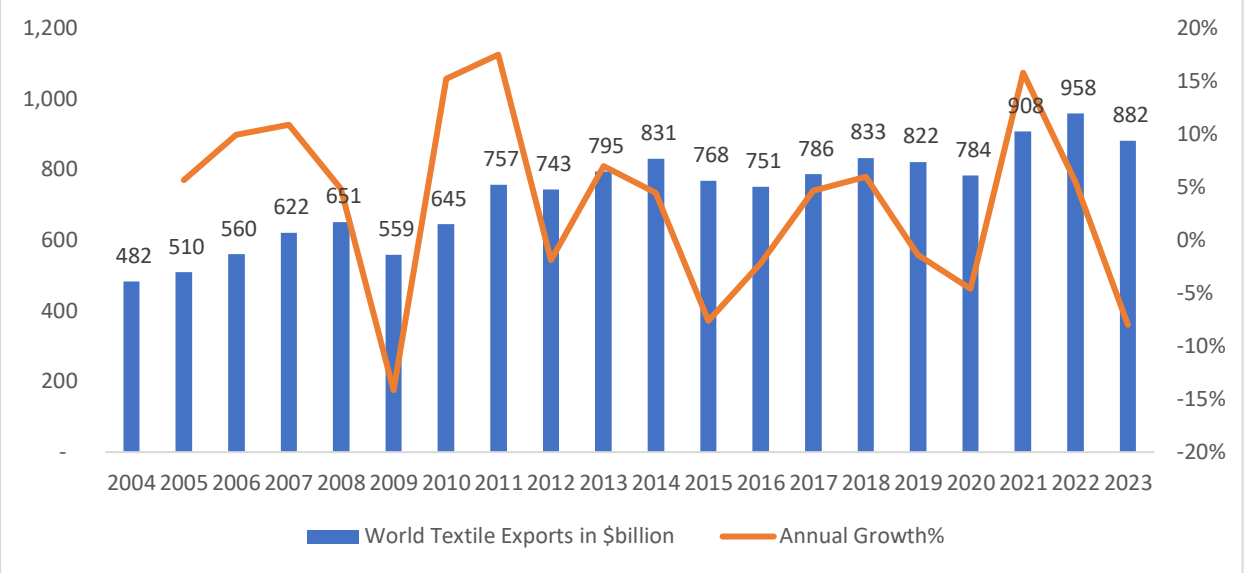
Beyond its economic contribution, the textile sector is a crucial driver of social and economic development, especially in emerging economies. Millions of workers, predominantly women, depend on textile and garment production for their livelihoods, making the industry a key pillar of socio-economic stability in both urban and rural communities. Established textile-producing nations leverage the sector's strong export revenues and supply chain integration to bolster industrial growth, while developing and least-developed countries use textiles as a strategic industry to drive economic advancement and poverty alleviation.

Sustainability has become a defining force in global textile trade, prompting a shift towards circular economies, eco-friendly fibers, and responsible production practices. With growing concerns over climate change, resource scarcity, and environmental degradation, the industry is embracing new models of production that prioritize reduced waste, ethical sourcing, and carbon footprint mitigation. Innovations such as biodegradable textiles, bioengineered fibers, and closed-loop recycling systems are leading the way toward a more sustainable and environmentally conscious industry.

Recent years have also witnessed a technological revolution in textiles, driven by digitalization, automation, and rapidly evolving consumer preferences. Artificial intelligence, 3D knitting, and automated production are enhancing efficiency, minimizing waste, and redefining manufacturing processes. The rise of e-commerce and direct-to-consumer business models has fundamentally altered global supply chains, increasing the demand for shorter lead times, customization, and also shorter production cycles. Meanwhile, geopolitical uncertainties and shifting trade policies are forcing companies to rethink their sourcing strategies, with many pivoting toward regionalized supply chains to ensure greater resilience and sustainability.

Looking ahead, the textile industry stands at the intersection of innovation, sustainability, and ethical responsibility. Governments, industry leaders, and consumers are increasingly emphasizing transparency, fair labor practices, and eco-friendly solutions, ensuring that textiles remain both a competitive and responsible sector. As the industry adapts to these evolving dynamics, its influence on economies, societies, and technological advancements will only continue to grow. Understanding these transformations requires a closer look at the trajectory of global textile trade, highlighting key trends that have shaped its past, present, and future.

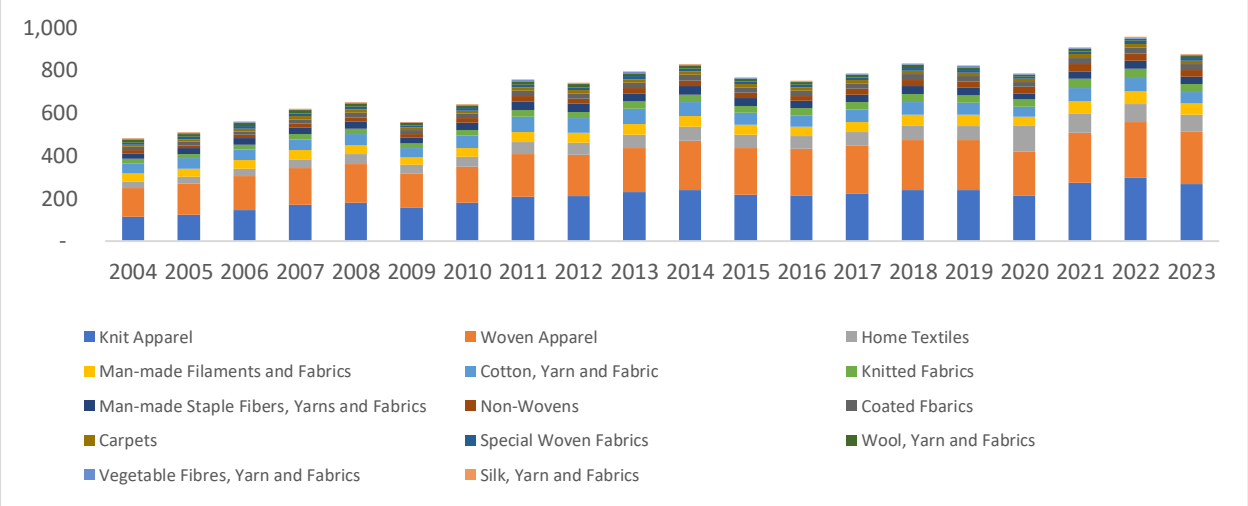
Table 1: World Textiles Exports in $ billion



The trade of textiles has evolved significantly over the years, with various subsectors contributing to the global textile economy. World textile exports increased from $482 billion in 2004 to $882 billion in 2023, reflecting a compound annual growth rate (CAGR) of 3.22%.

To better understand the dynamics of global textile trade, it is essential to examine the performance of individual categories. The following breakdown highlights how different textile segments have evolved over the years.

Table 2: Category Wise Textile Exports



Among the major categories, knit apparel saw a rise from $115 billion in 2004 to $267 billion in 2023, with a CAGR of 4.56%, increasing its share in global textile exports from 24% to 31%. Woven apparel, another dominant category, grew from $134 billion to $248 billion, registering a CAGR of 3.28% while maintaining its 28% share in global trade. Home textiles expanded notably from $29 billion to $77 billion, achieving a CAGR of 5.21% and increasing its share from 6% to 9%.

Man-made filaments and fabrics grew at a slower rate, increasing from $38 billion in 2004 to $54 billion in 2023, with a CAGR of 1.91%, resulting in a decline in share from 8% to 6%. Cotton, yarn, and fabric exports exhibited minimal growth, moving from $50 billion to $52 billion, with a negligible CAGR of 0.23%, leading to a drop in share from 10% to 6%. Knitted fabrics expanded from $20 billion to $37 billion, reflecting a CAGR of 3.44% and maintaining a 4% share. Man-made staple fibers, yarns, and fabrics saw an increase from $27 billion to $35 billion, with a CAGR of 1.37%, reducing its share from 6% to 4%. Non-wovens experienced significant growth, moving from $13 billion to $30 billion, with a CAGR of 4.53%, keeping its share stable at 3%. Coated fabrics followed a similar trend, rising from $16 billion to $28 billion, achieving a CAGR of 2.98%, and retaining a 3% share.

Carpets saw moderate growth from $11 billion to $17 billion, with a CAGR of 2.44% and a stable 2% share. Special woven fabrics expanded from $11 billion to $12 billion, with a CAGR of 0.74%, causing a decline in share from 2% to 1.4%. Wool, yarn, and fabrics declined from $13 billion to $11 billion, reflecting a negative CAGR of -0.90% and reducing its share from 3% to 1.3%. Vegetable fibers, yarn, and fabrics increased from $4 billion to $6 billion, with a CAGR of 2.79%, maintaining a share close to 0.7%. Lastly, silk, yarn, and fabrics declined from $3 billion to $2 billion, with a negative CAGR of -2.43%, reducing its share from 0.6% to 0.2%. These trends highlight the shifts in global textile trade, with apparel and home textiles witnessing the most significant expansion, while traditional fabric categories such as wool and silk have seen declines.

ICAC member countries play a crucial role not only in cotton production but also in the broader textile industry. Their economic significance extends across various indicators, including GDP growth, investment levels, labor force participation, and trade performance in textiles and garments. Analyzing these metrics provides insights into their competitive positioning in global trade.

This section begins with an over review of Argentina, followed by other ICAC member nations, briefly discussing their economic, textile and garment trade, for in-depth report please refer to “Textiles in ICAC Member Countries”.

Argentina

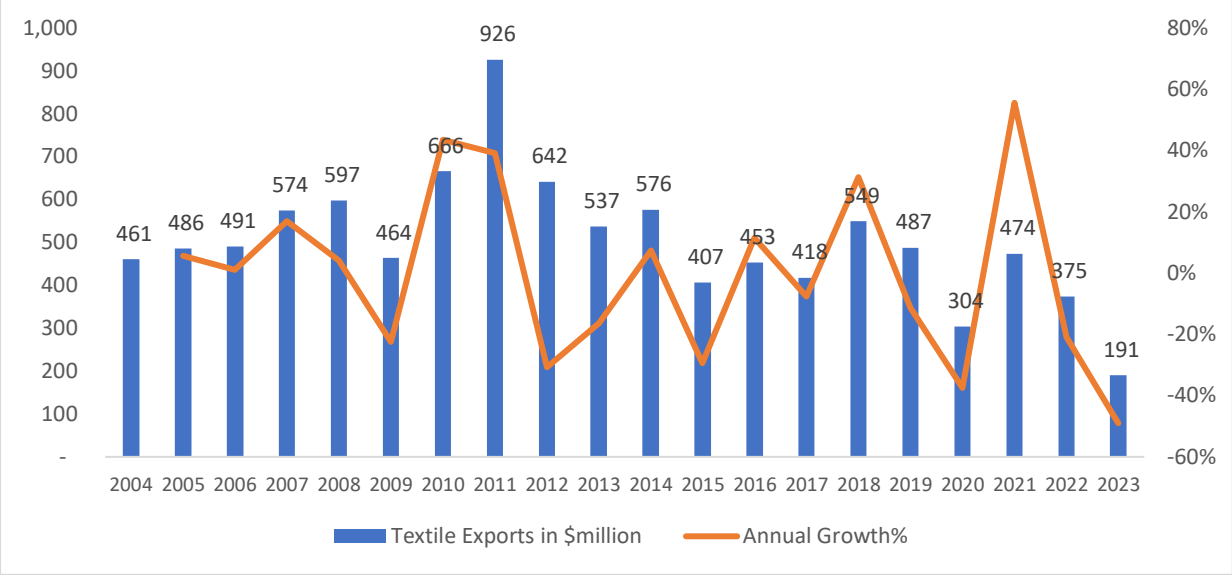
Argentina’s GDP growth fluctuated significantly from 2004 to 2023, reaching 10.13% in 2010 before contracting to -9.90% in 2020. A strong rebound in 2021 saw growth rise to 10.44%, though by 2023, GDP had declined by -1.61%. Forecasts suggest a recovery to 5.00% by 2025. In current prices, GDP expanded from $165 billion in 2004 to $642 billion in 2015, declined to $385 billion in 2020, and climbed back to $646 billion in 2023, with moderate growth expected ahead.

GDP per capita rose from $4,314 in 2004 to $14,895 in 2015 before dropping to $8,489 in 2020, recovering to $13,823 by 2023. Investment as a percentage of GDP reached a high of 20.10% in 2007, stood at 18.81% in 2023, and is projected to increase to 21.58% by 2025. Foreign Direct Investment inflows, which stood at $15.32 billion in 2012, fell to $4.88 billion in 2020 before surging to $23.87 billion in 2023.

Argentina’s population grew from 38.23 million in 2004 to 46.24 million in 2022, with projections indicating 47.64 million by 2025. The labor force expanded from 17.5 million in

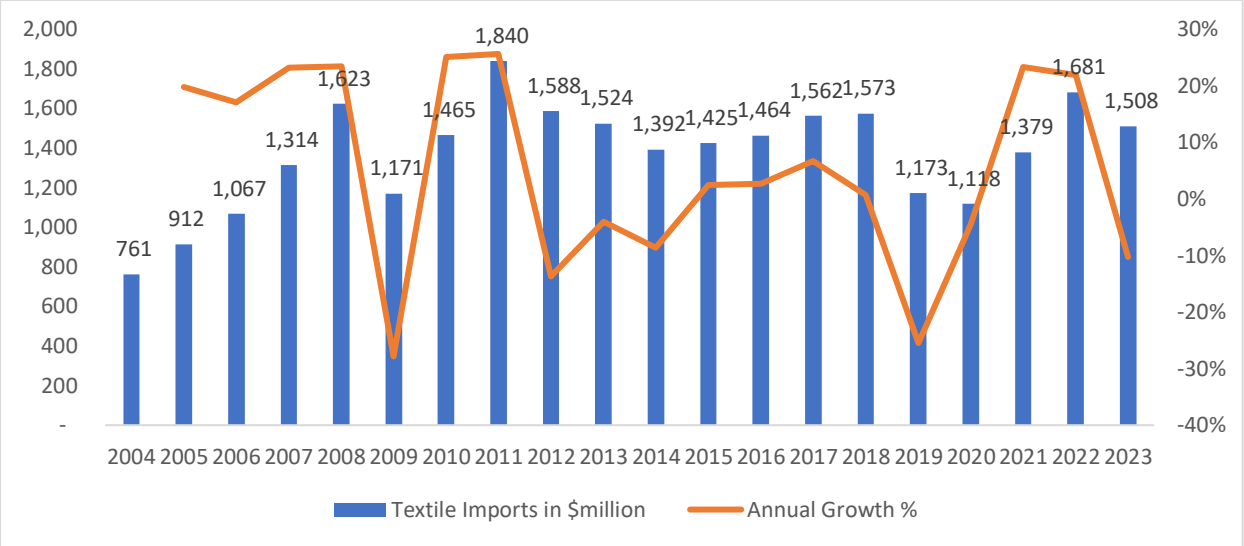
2004 to 21.53 million in 2023, with female participation at 42.55% and 22% of the population under age 15.

Table 3: Textile Exports in $million



Textile exports, which totaled $926 million in 2011, dropped significantly to $191 million in 2023, reducing Argentina's global share from 0.10% to 0.02%.

Table 4: Textile Imports in $million



Textile imports grew from $761 million in 2004 to $1,508 million in 2023. Garment exports, once at $106 million in 2008, fell to $20 million in 2023, maintaining a global share of 0.004%. Meanwhile, garment imports rose from $94 million in 2004 to $370 million in 2023, holding a 0.08% share of global imports.

Australia

Australia's GDP growth remained relatively stable between 2004 and 2023, reaching at 4.35% in 2007, with a notable contraction of -2.10% in 2020 due to COVID-19. After

rebounding to 5.48% in 2021, growth moderated to 3.92% in 2022 and is forecasted to stabilize around 2.12% by 2025.

Australia's GDP in current prices grew consistently from $659 billion in 2004 to $1.74 trillion in 2023, despite temporary setbacks during global crises. After a brief dip in 2020 to $1.36 trillion, strong recovery led GDP to rise to $1.65 trillion in 2021, with projections forecasting continued growth up to $1.88 trillion by 2025.

Australia's GDP per capita increased notably from $32,863 in 2004 to a peak of $68,489 in 2012, reflecting strong economic growth. Following fluctuations, it declined to $53,250 in 2020 due to the pandemic but quickly recovered to $64,352 in 2021, with projections indicating further growth to $67,979 by 2025.

Australia's total investment as a percentage of GDP remained relatively stable, ranging from 27.21% in 2004 to a peak of 28.44% in 2012, before declining gradually to 22.30% in 2020. Post-pandemic recovery raised investment slightly to 23.31% in 2021, with projections suggesting stabilization around 24% by 2025.

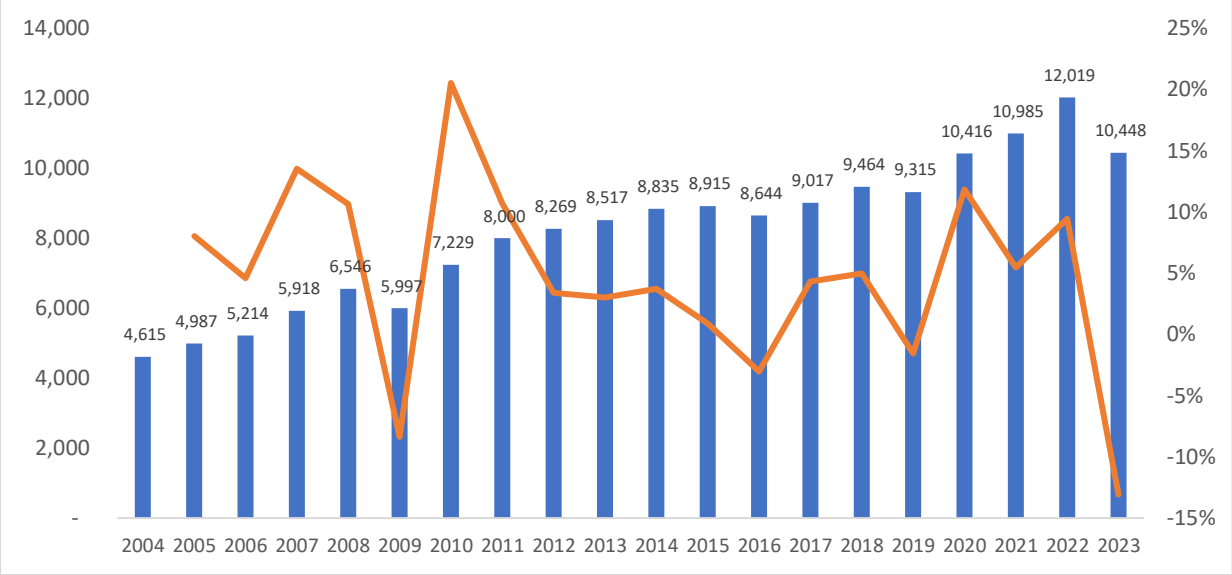
Australia's population steadily increased from 20.05 million in 2004 to 25.77 million in 2021, with projections indicating further growth to 27.67 million by 2025. Australia's labor force expanded consistently from 10.13 million in 2004 to 14.50 million in 2023, with significant female participation at 47.06% in 2023.

Foreign direct investment (FDI) into Australia displayed considerable volatility from 2004 to 2023, initially dropping from $42.91 billion in 2004 to negative inflows in 2005, then reaching at $68.68 billion in 2022. In 2023, FDI moderated to $32.74 billion.

Table 5: Textile Exports in $million

Australian textile exports fluctuated significantly between 2004 and 2023, reaching notably at $6,174 million in 2022 following a sharp recovery from the pandemic-induced low of $2,354 million in 2020. In 2023, exports slightly decreased to $5,711 million, capturing approximately 0.65% of global textile exports, with a compound annual growth rate (CAGR) of 3.20% over the period.

Table 6: Textile Imports in $million



Australia’s textile imports grew steadily from $4,615 million in 2004 to a peak of $12,019 million in 2022, reflecting sustained demand for textile products. Imports declined by 13% to $10,448 million in 2023, yet Australia's global import share remained stable at approximately 1.36%, with a CAGR of 4.39% over the period.

Australia's garment exports have grown consistently, from $186 million in 2004 to $401 million in 2023, achieving a compound annual growth rate (CAGR) of 4.12%. Despite fluctuations, including a decline during the 2009 financial crisis, exports rebounded strongly, reaching a 20-year high in 2023. Australia's global market share increased from 0.07% in 2004 to 0.08% in 2023.

Australia's garment imports have shown consistent growth, rising from $2,574 million in 2004 to $7,538 million in 2023, reflecting a compound annual growth rate (CAGR) of 5.82%. Despite a brief decline in 2009, imports quickly recovered, reaching a peak of $8,258 million in 2022. Australia's share of global garment imports also increased notably, from 0.99% in 2004 to 1.69% in 2023, underscoring its expanding importance in global garment trade.

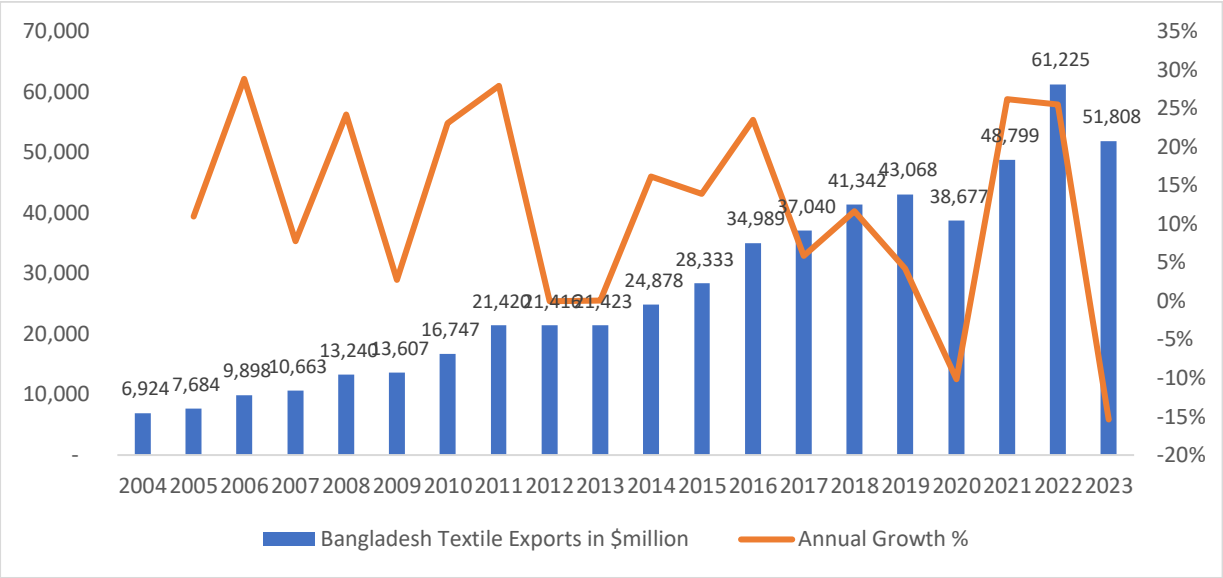
Bangladesh

Bangladesh has demonstrated strong and sustained economic growth over the past two decades, with GDP expanding significantly from $77 billion in 2004 to $452 billion in 2023, despite temporary slowdowns due to global economic conditions and the COVID-19 pandemic. GDP growth peaked at 7.88% in 2019, indicating robust economic resilience. Although growth rates moderated slightly to 7.10% in 2022, projections suggest steady economic momentum will continue, reaching $482 billion by 2025.

GDP per capita has consistently risen from $563 in 2004 to $2,652 in 2023, highlighting ongoing improvements in living standards and economic productivity, with further growth anticipated in coming years. Total investment as a percentage of GDP has also increased steadily from 25.5% in 2004, reaching at 32.21% in 2019, reflecting consistent confidence in Bangladesh’s economic potential.

Bangladesh's population growth has been steady, reaching 170.28 million in 2023, projected to increase further to 173.74 million by 2025, providing a growing labor force of 71.44 million in 2023. Notably, female workforce participation reached 32.95 million. Foreign Direct Investment (FDI) has fluctuated, peaking at $2.60 billion in 2013 but declining to $1.39 billion by 2023.

Table 7: Textile Exports in $million



In international trade, Bangladesh has notably strengthened its position in the global textiles and garments market. Textile exports grew remarkably from $6,924 million in 2004 to $51,808 million in 2023, capturing 5.88% of global exports. Similarly, garment exports surged from $6.23 billion in 2004 to $49.59 billion in 2023, securing 9.60% of global market share, underscoring Bangladesh's growing competitiveness and strategic importance in global textile and garment trade.

Table 8: Textile Imports in $million

Textile imports increased significantly over the years, reaching $14,234 million in 2023, reflecting the country's expanding industrial base and internal demand, while garment imports experienced volatility, declining overall to $233 million by 2023.

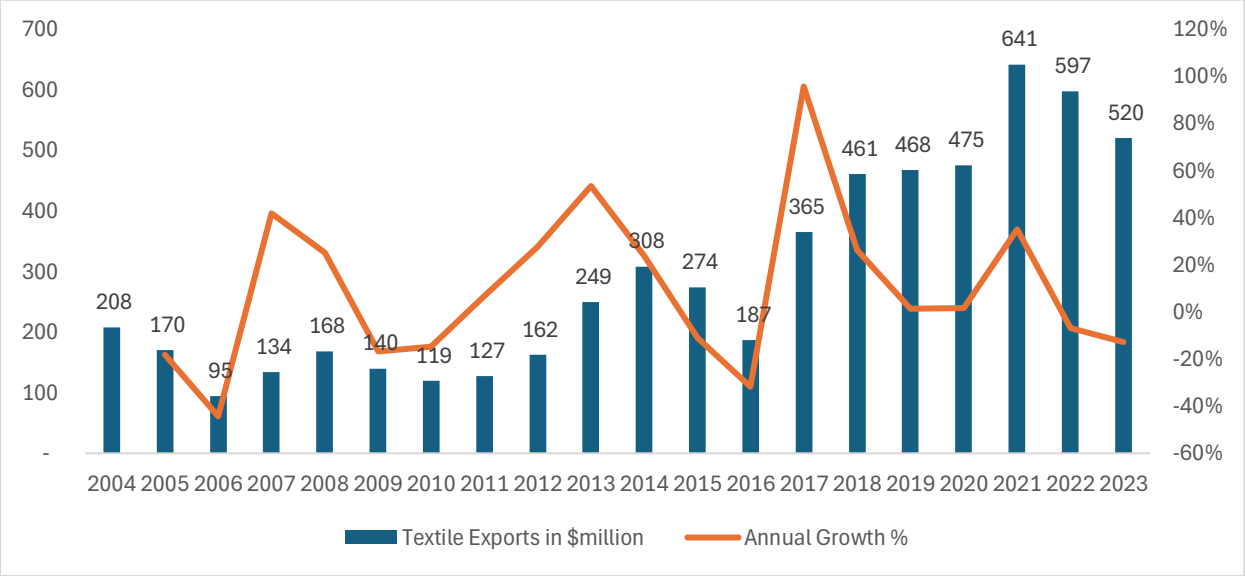
Benin

Benin's economy has experienced consistent but fluctuating growth over the past two decades, with GDP growth reaching at 7.19% in 2013 and recovering robustly to 7.16% in 2021 after the COVID-19 pandemic disruption. GDP in current prices rose steadily from $6 billion in 2004 to $18 billion in 2021, and it is projected to reach $23 billion by 2025. GDP per capita has similarly improved from $784 in 2004 to $1,362 in 2021, with forecasts indicating continued growth to $1,587 by 2025.

Investment in Benin has shown significant expansion, rising sharply from 15.22% of GDP in 2004 to a notable 40.47% by 2023. Despite slight expected moderation, high investment rates suggest continued economic vitality. Foreign direct investment (FDI), after initial fluctuations and modest inflows, reached $0.43 billion in 2023, indicating increasing investor confidence.

Benin's population and labor force have steadily grown, reaching 13.73 million people and a labor force of 5.15 million by 2023. Notably, female participation in the labor force is substantial, at 45.46% in 2023, reflecting growing gender inclusivity.

Table 9: Textile Exports in $million



In trade, Benin's textile exports experienced significant growth, rising from $208 million in 2004 to $520 million in 2023, achieving a compound annual growth rate (CAGR) of 4.95%.

Table 10: Textile Imports in $million

Textile imports grew moderately from $97 million in 2004 to $122 million in 2023. Garment exports, despite notable volatility, reached $1.99 million in 2023, reflecting recent growth opportunities, whereas garment imports significantly fluctuated, reaching approximately $4 million by 2023.

Brazil

Brazil's GDP growth has fluctuated over the past two decades, with robust expansion from 2004 to 2010, hitting a peak of 7.53% in 2010. However, economic contractions in 2015 and 2016, shrinking by 3.55% and 3.28%, respectively, highlighted financial challenges. Growth rebounded in 2021 at 4.76%, with projections indicating continued but moderate expansion through 2025.

The country's GDP in current prices rose from $669 billion in 2004 to a projected $2.31 trillion in 2025, with its highest level of $2.61 trillion recorded in 2011 before economic downturns led to temporary declines. Recovery efforts have since driven GDP back to $2.17 trillion in 2023, with steady increases expected i.e. 2.23 trillion by 2025.

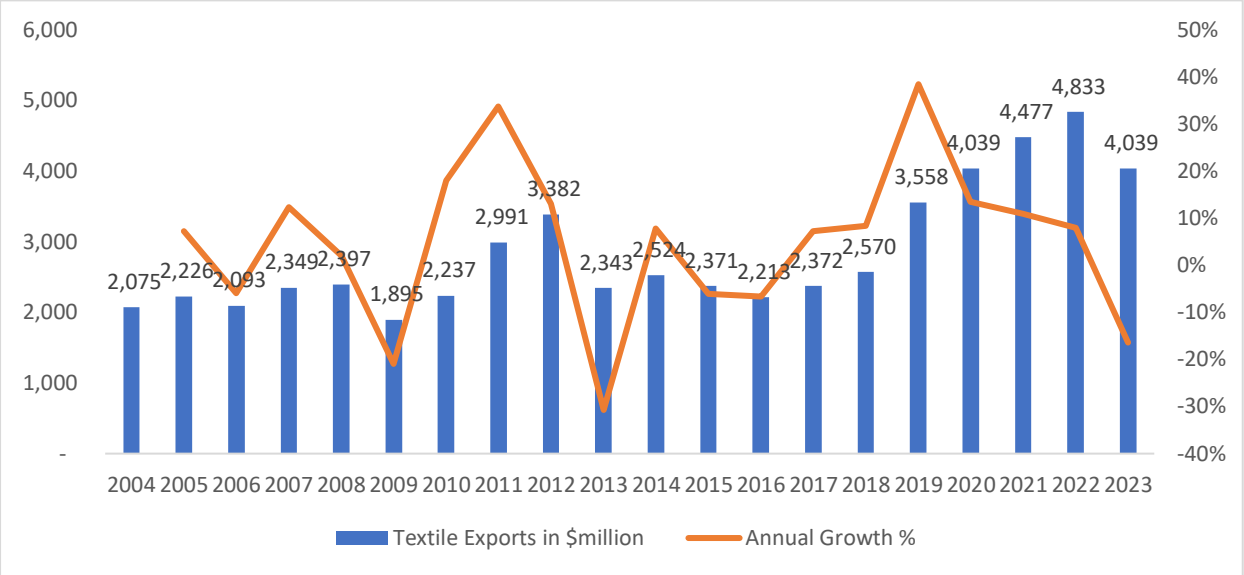
GDP per capita followed a similar trajectory, climbing from $3,648 in 2004 to its highest value of $13,326 in 2011 before contracting during the economic crises of 2015-2016. A recovery pushed it to $10,268 by 2023, with forecasts suggesting further gains to $10,816 by 2025.

Total investment as a percentage of GDP fluctuated between 17.91% in 2004 and a high of 21.83% in 2011. It later declined to 14.63% in 2017 but rebounded post-COVID-19 to 19.52% in 2021. However, a downward trend has followed, with projections of 15.80% in 2025.

Brazil's population has shown steady growth, reaching 212.54 million in 2024 and expected to rise slightly to 213.32 million in 2025. Meanwhile, the labor force expanded from 87.10 million in 2004 to 106.13 million in 2023, with female participation standing at 43.35%.

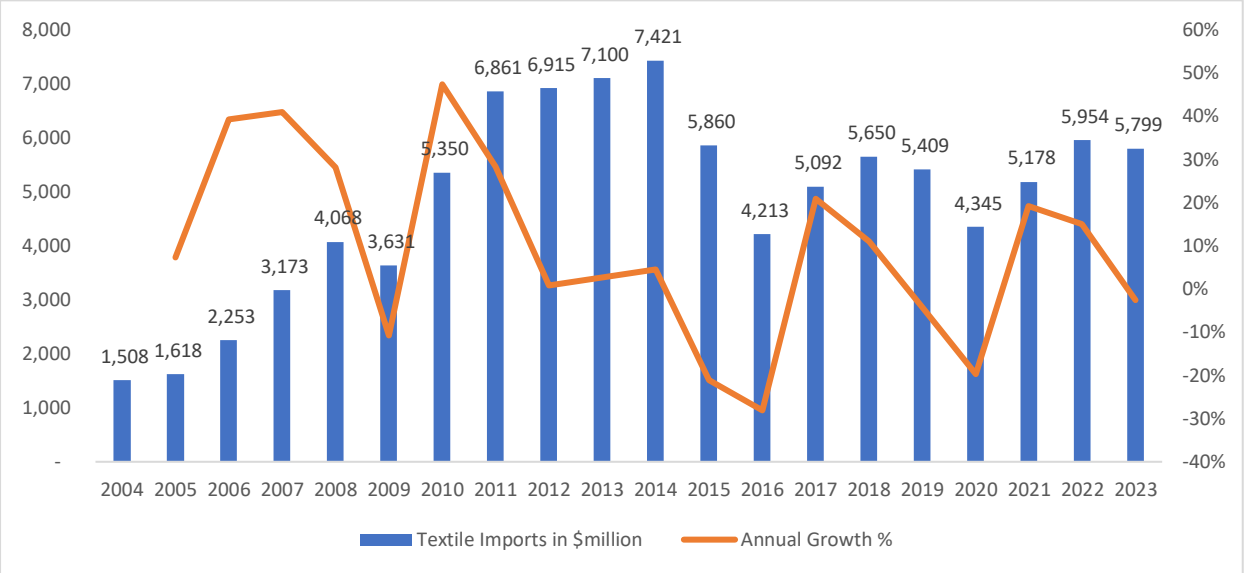
Foreign direct investment (FDI) experienced surges and declines, rising from $18.16 billion in 2004 to a record $102.43 billion in 2011 before tapering due to economic instability. Despite declines, Brazil remained a key FDI destination, attracting $64.23 billion in 2023.

Table 11: Textile Exports in $million



Brazil's textile exports have shown long-term growth with intermittent downturns, starting at $2,075 million in 2004 and reaching a high of $4,833 million in 2022 before contracting to $4,039 million in 2023.

Table 12: Textile Imports in $million



Textile imports expanded from $1,508 million in 2004, hitting their highest level of $7,421 million in 2014, and stabilizing at $5,799 million in 2023. Garment exports have declined over time, from $339 million in 2004 to $189 million in 2023, reducing Brazil’s global share in the sector. Conversely, garment imports have shown strong growth, climbing from $158 million in 2004 to $1,863 million in 2023.

Burkina Faso

Burkina Faso's GDP growth has been marked by fluctuations, with strong expansion periods, such as 8.66% in 2005 and 8.45% in 2009, alongside slower growth in 2015 and 2020 at 3.92% and 1.92%, respectively. A post-pandemic recovery saw GDP rise by 6.94% in 2021, with projected growth of 5.79% in 2025.

The country's GDP in current prices grew from $5 billion in 2004 to $20 billion in 2021, experiencing temporary declines in 2015 and 2022. Projections indicate continued expansion, reaching $24 billion by 2025.

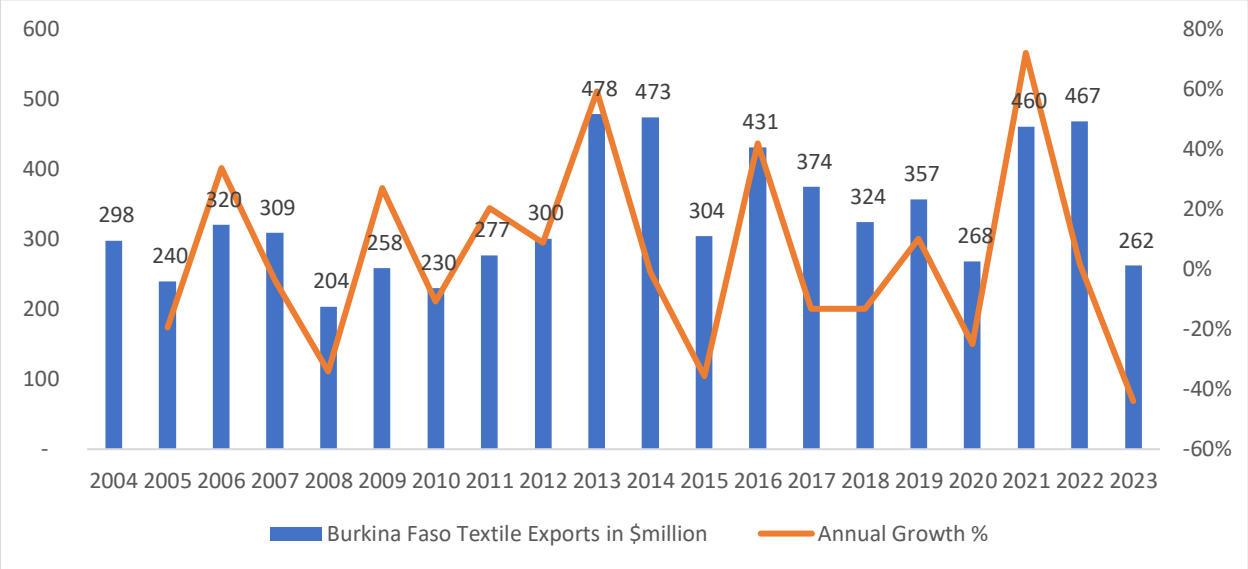
GDP per capita followed a similar trajectory, rising from $405 in 2004 to $824 in 2020, with future estimates suggesting an increase to $952 by 2025. Despite occasional setbacks, the long-term trend reflects steady improvements in living standards.

Total investment as a percentage of GDP has varied, increasing from 15.52% in 2004 to a high of 25.87% in 2018. Investment remained stable through the pandemic and is expected to reach 25.32% in 2025, highlighting sustained economic development efforts.

Burkina Faso's population has grown from 13.45 million in 2004 to a projected 24.74 million in 2025, reflecting demographic expansion that presents both economic opportunities and infrastructural challenges. The labor force expanded accordingly, reaching 8.63 million in 2023.

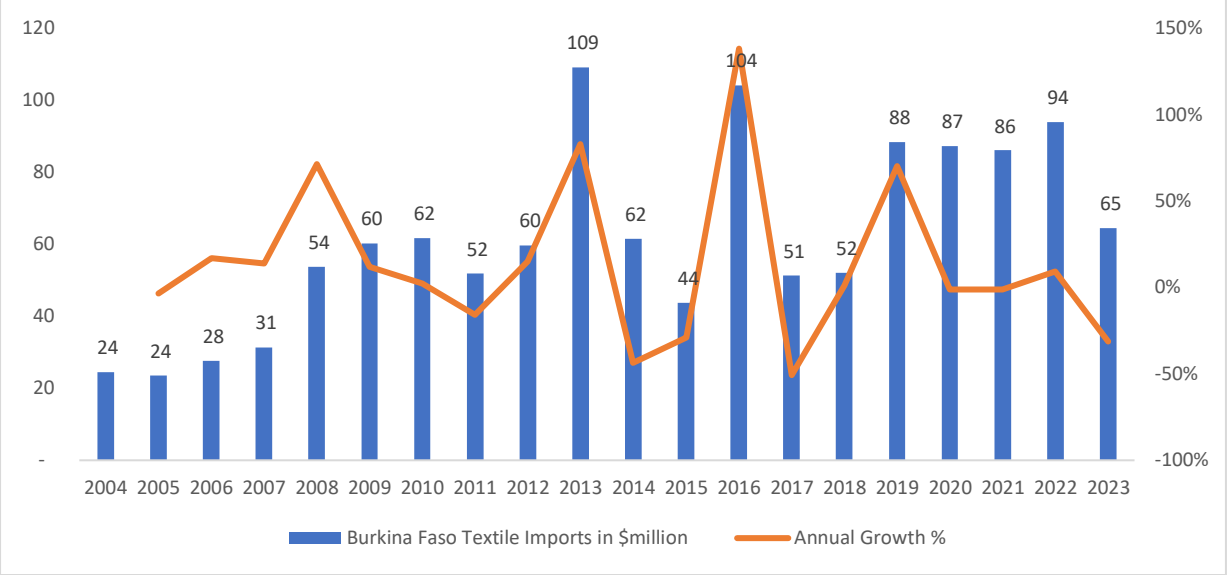
Foreign direct investment (FDI) peaked at $0.49 billion in 2013 but faced negative inflows in 2021 and 2022 due to economic and political instability. However, positive inflows of $0.09 billion in 2023 indicate a gradual return of investor confidence.

Table 13: Textile Exports in $million



Textile exports have been highly volatile, fluctuating between $204 million and $478 million from 2004 to 2023. After reaching at $460 million in 2021, exports dropped sharply to $262 million in 2023.

Table 14: Textile Imports in $million



Textile imports, which stood at $24 million in 2004, saw notable growth, reaching $94 million in 2022 before falling to $65 million in 2023. Garment exports have remained minimal, fluctuating from $0.3 million in 2004 to just $0.2 million in 2023, with an overall declining trend. Garment imports, however, have shown growth, rising from $3 million in 2004 to a peak of $27 million in 2020 before stabilizing at $13 million in 2023.

Cameroon

Cameroon's GDP growth has been variable, expanding by 6.56% in 2004 but slowing significantly to 1.22% in 2005. After recovering and reaching at 5.78% in 2014, growth stabilized between 3% and 5% in the following years. The COVID-19 pandemic caused a sharp slowdown to 0.54% in 2020, but the economy rebounded with a projected growth rate of 4.21% by 2025.

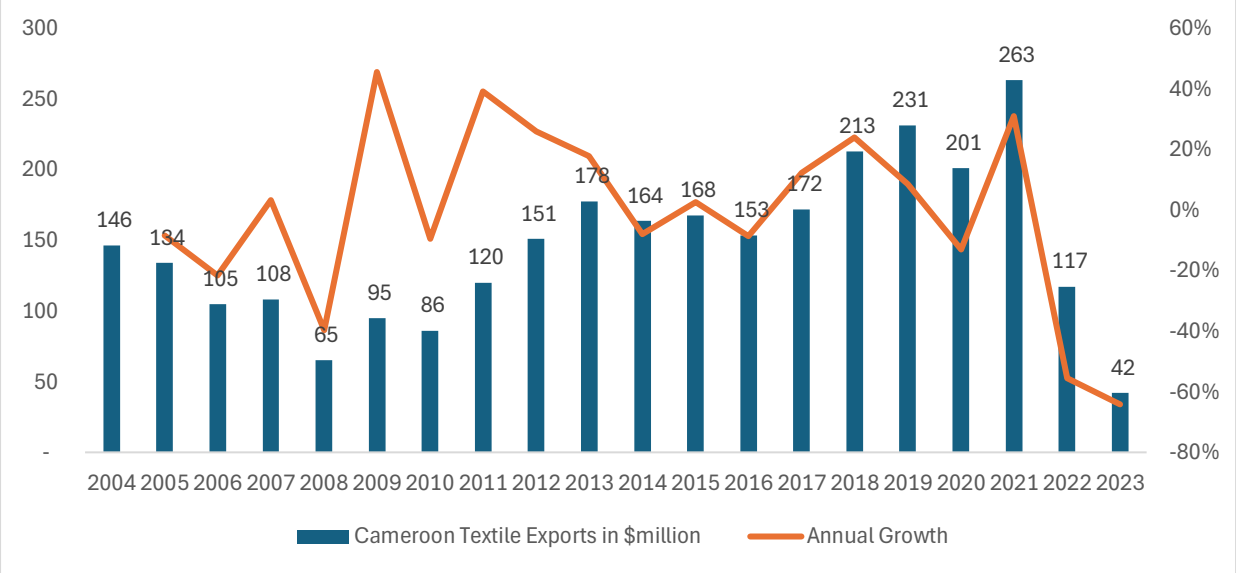
In current prices, Cameroon's GDP grew steadily from $19 billion in 2004 to $41 billion in 2020. Projections indicate continued expansion, reaching $58 billion by 2025.

GDP per capita followed a similar upward trend, increasing from $1,089 in 2004 to a projected $1,923 in 2025.

Total investment as a percentage of GDP has remained stable, fluctuating around 18-19% in recent years. Projections indicate a rise to 21.05% by 2025, signaling sustained capital allocation toward infrastructure and industrial development.

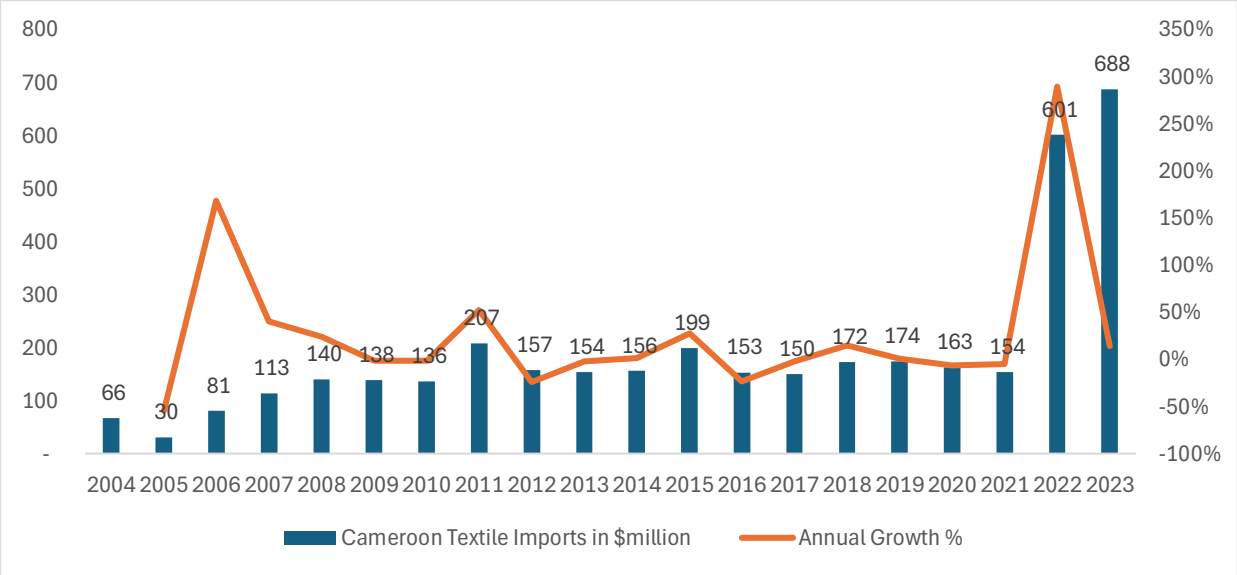
Cameroon's population has steadily grown from 17.26 million in 2004 to 28.61 million in 2023, with an expected increase to 30.03 million by 2025. The labor force expanded from 7.59 million in 2004 to 11.89 million in 2023, with female participation reaching 47.27%. Foreign direct investment (FDI) has shown fluctuations, with inflows reaching at $1.02 billion in 2020 before moderating to $0.80 billion in 2023.

Table 15: Textile Exports in $million



Textile exports have experienced volatility, declining from $146 million in 2004 to $42 million in 2023.

Table 16: Textile Imports in $million



Textile imports surged from $66 million in 2004 to $688 million in 2023, demonstrating increased domestic demand. Garment exports remained minimal, with fluctuations from $0.29 million in 2004 to $1.74 million in 2023, despite occasional growth spurts. Garment imports expanded significantly, rising from $11 million in 2004 to $291 million in 2023.

Cote d'Ivoire

Côte d'Ivoire's GDP growth has been marked by variability, with a contraction of -4.86% in 2011, followed by a strong recovery in 2012 at 10.86%. Growth remained stable above 8% until 2018 before moderating to 4.84%. The economy rebounded in 2021 with 7.06% growth,

and projections for 2024 and 2025 indicate continued expansion at 6.50% and 6.40%, respectively.

In current prices, GDP increased from $23 billion in 2004 to a projected $95 billion by 2025, demonstrating sustained economic resilience and development. GDP per capita followed a similar trend, rising from $1,260 in 2004 to a projected $2,902 in 2025, indicating improving living standards.

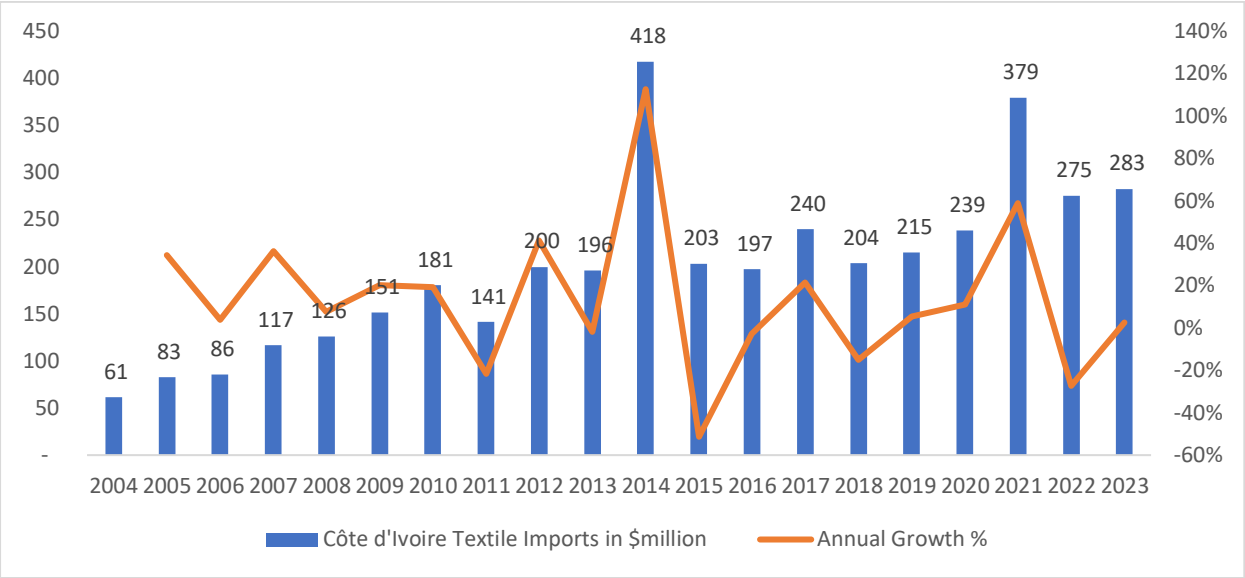
Total investment as a percentage of GDP has increased significantly, rising from 10.98% in 2004 to an expected 25.84% in 2025, reflecting a strong focus on infrastructure and economic growth.

Côte d'Ivoire's population has steadily grown from 18.2 million in 2004 to an estimated 32.9 million by 2025. The labor force expanded from 6.84 million in 2004 to 11.79 million in 2023, with female participation reaching 42.81%. A youthful demographic structure, with 41.27% of the population aged 0-14, highlights the need for education and job creation strategies. Foreign direct investment (FDI) has shown steady growth, increasing from $0.28 billion in 2004 to $1.75 billion in 2023, driven by policy reforms and a stable business environment.

Table 17: Textile Exports in $million

Textile exports fluctuated over the years, reaching at $506 million in 2021 before falling to $299 million in 2023.

Table 18: Textile Imports in $million



Côte d'Ivoire's textile imports have grown significantly, reaching $283 million in 2023, underscoring increasing domestic demand. Garment exports remained minimal, reaching at $4 million in 2021 before declining to $3 million in 2023. Meanwhile, garment imports have grown steadily, rising from $7 million in 2004 to $43 million in 2023, indicating increased demand in the domestic market.

Egypt

Egypt's economy has experienced periods of strong expansion and contraction over the past two decades. GDP growth peaked at 7.16% in 2008 before slowing to 1.77% in 2011 due to political and economic instability. A recovery ensued, with growth reaching 5.55% in 2019. Despite the COVID-19 pandemic's impact in 2020, Egypt rebounded with 6.65% growth in 2022. Projections for 2024 and 2025 suggest a moderate recovery at 2.67% and 4.08%, reflecting ongoing economic reforms and structural adjustments.

Egypt's GDP in current prices expanded significantly from $83 billion in 2004 to $475 billion in 2022. However, a projected decline to $346 billion by 2025 highlights economic volatility. Similarly, GDP per capita peaked at $4,587 in 2022 but is expected to decrease to $3,160 by 2025, indicating potential economic challenges.

Investment as a percentage of GDP has fluctuated, reaching at 28.49% in 2008 before declining to 12.88% in 2023. Projections indicate a further drop to 11.07% in 2025, emphasizing the need for targeted reforms to boost investor confidence.

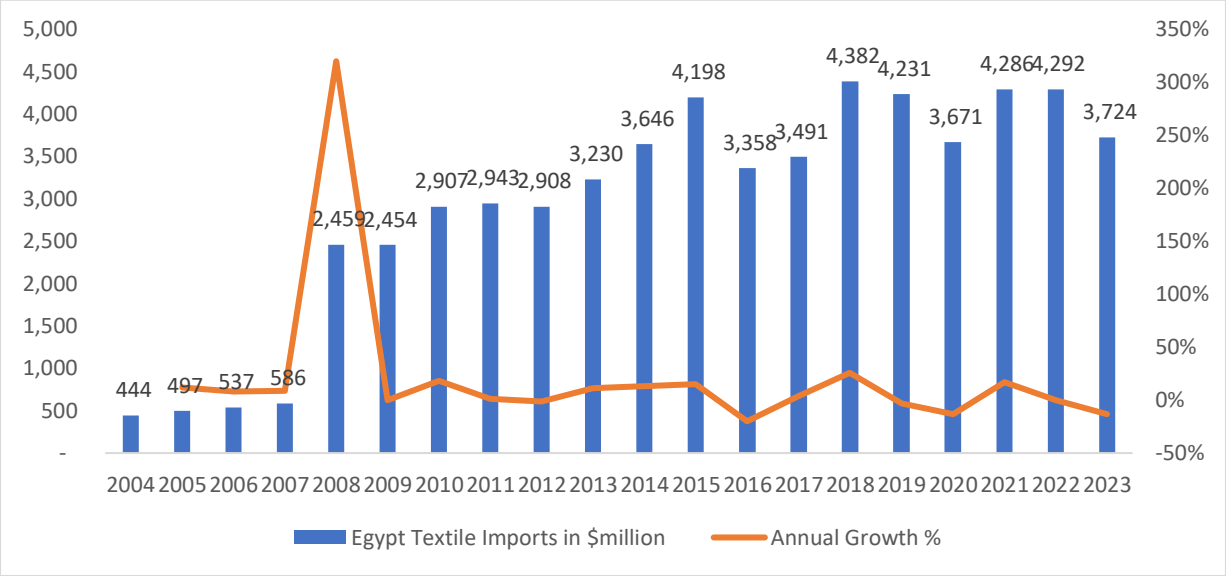
Egypt's population has grown steadily from 69.3 million in 2004 to 109.45 million in 2025. The labor force has similarly expanded from 23.29 million to 34.06 million over the same period, with 32.43% of the population under 14 years old. However, female labor force participation remains low at 18.63%, presenting opportunities for increased workforce diversity.

Foreign direct investment (FDI) surged from $1.25 billion in 2004 to a peak of $11.58 billion in 2007 before declining during political instability. By 2022, FDI rebounded to $11.40 billion, with 2023 recording $9.84 billion, reflecting renewed investor confidence.

Table 19: Textile Exports in $million

Egypt's textile exports grew significantly, reaching $4,388 million in 2023, with a compound annual growth rate (CAGR) of 8.06%, outperforming the global average of 3.22%. Garment exports also demonstrated strong growth, rising from $234 million in 2004 to $2,448 million in 2023, with a CAGR of 13.16%. The sector rebounded strongly after the COVID-19 pandemic, reaching a peak of $2,497 million in 2022.

Table 20: Textile Imports in $million



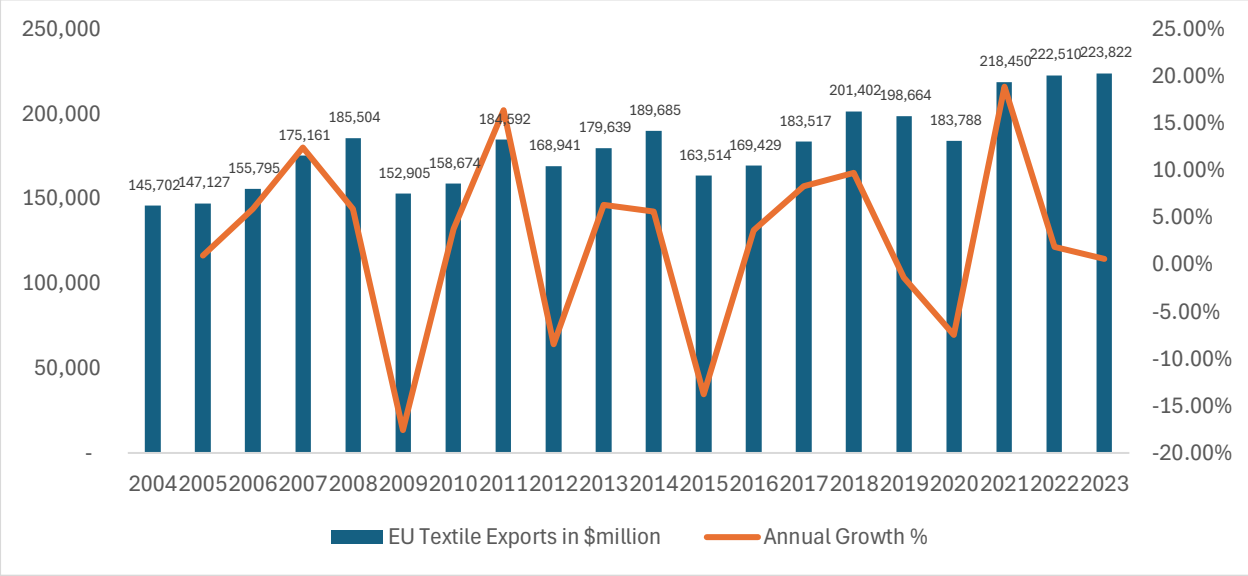
Textile imports expanded at a CAGR of 11.84%, reaching at $4,286 million in 2021 before declining to $3,724 million in 2023, reflecting Egypt's growing role as a textile importer.

Garment imports have been highly volatile, with a CAGR of 17.94%. Imports peaked at $880 million in 2014 before fluctuating significantly, settling at $290 million in 2023.

European Union (EU)

The European Union remains a key player in global textile and garment trade, with steady growth.

Table 21: Textile Exports in $million



Textile exports grew at a CAGR of 2.29%, reaching $223.8 billion in 2023, while imports increased at 2.65%, totaling $262.9 billion. The EU's global share in textile exports declined from 30.20% in 2004 to 25.39% in 2023, while its share in imports remained above 30%, peaking at 35.70% in 2008.

Table 22: Textile Imports in $million

Garment exports saw a CAGR of 3.71%, reaching $148.1 billion in 2023, while imports grew at 3.82% to $186 billion. The EU's share in global garment exports declined slightly to 28.68%, but it remains the largest garment importer, capturing 41.59% of global market share in 2023.

India

India's economy has demonstrated strong growth over the past two decades, with GDP expanding from $709 billion in 2004 to a projected $4.27 trillion in 2025. Growth has been marked by resilience in the face of global financial challenges, including a sharp rebound from the 5.78% contraction in 2020 due to COVID-19, surging to 9.69% in 2021. Future projections indicate stable growth, with GDP expected to expand at a rate of 6.46% in 2025.

GDP per capita has steadily increased, rising from $624 in 2004 to an estimated $2,937 in 2025, reflecting improving living standards and sustained economic expansion. Investment as a percentage of GDP peaked at 41.95% in 2007 before gradually declining to 28.92% in 2020. However, recent trends indicate a revival, with investment levels projected to reach 33.52% in 2025.

India's population continues to grow, reaching 1.45 billion by 2025, making it one of the world's largest consumer and labor markets. The labor force has expanded significantly from 413.64 million in 2004 to 596.41 million in 2023. Female labor force participation stands at 28.68%, indicating room for further inclusivity in employment. With 25.05% of the population aged 0-14, India benefits from a large, young workforce poised to drive future economic growth.

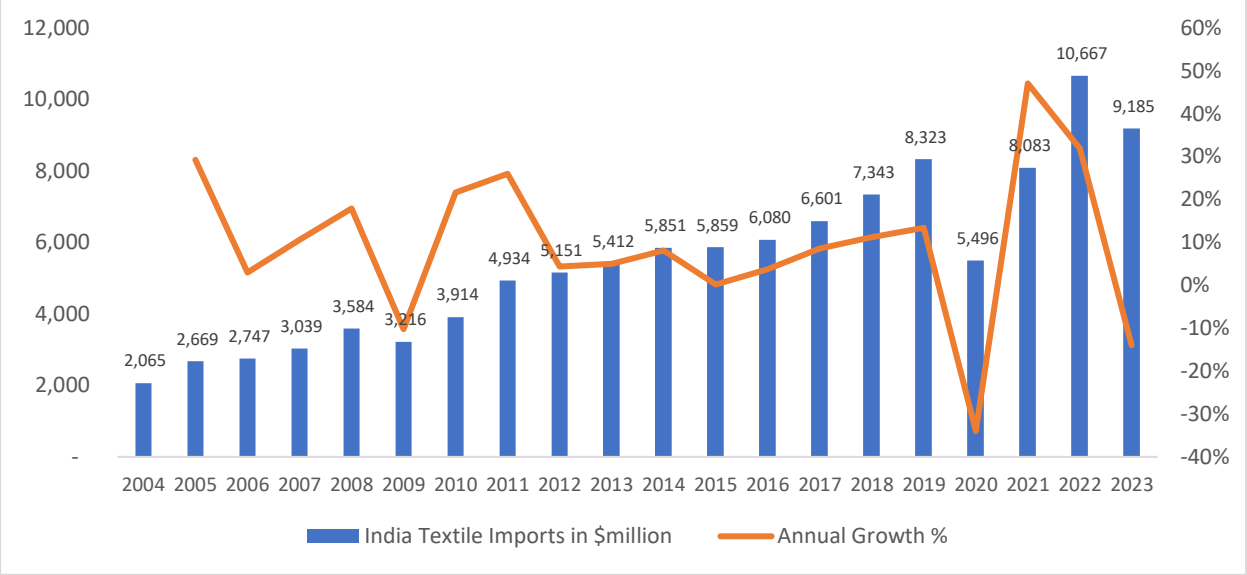
Foreign direct investment (FDI) has been a crucial driver of economic expansion, surging from $5.43 billion in 2004 to a peak of $64.36 billion in 2020. However, FDI inflows declined to $28.08 billion in 2023.

Table 23: Textile Exports in $million

India remains a major global player in textiles and garments. Textile exports grew from $14,154 million in 2004 to $34,234 million in 2023, with a peak share of 5.05% in 2013.

Despite some recent declines, India maintains a strong foothold in the global textile market, with a compound annual growth rate (CAGR) of 4.76%.

Table 24: Textile Imports in $million



Textile imports have expanded significantly, rising from $2,065 million in 2004 to $9,185 million in 2023. The CAGR of 8.17% highlights India's growing demand for textile products, with a peak global import share of 1.24% in 2022. In garments, India's exports have steadily increased, reaching $14,505 million in 2023, with a 2.81% share of global garment exports. Meanwhile, garment imports have experienced rapid growth, surging from $32 million in 2004 to $1,564 million in 2023. The CAGR of 22.77%.

Kazakhstan

Kazakhstan's economy has shown remarkable resilience and fluctuations over the past two decades. GDP at constant prices grew from 9.6% in 2004 but experienced volatility, notably contracting by 2.6% in 2020 due to COVID-19. Despite past economic slowdowns, projections for 2023-2025 indicate stable growth between 3.5% and 5.1%.

Kazakhstan's GDP in current prices expanded significantly, rising from $43 billion in 2004 to a projected $307 billion by 2025. GDP per capita followed a similar trend, increasing from $2,874 in 2004 to a projected $15,112 in 2025. While economic downturns in 2009 and 2016 led to temporary declines, Kazakhstan's overall trajectory remains positive, signaling improving living standards and sustained economic development.

Investment as a percentage of GDP has fluctuated, reaching at 35.53% in 2007 before declining due to global uncertainties. Projections indicate a slight decline from 29.56% in 2023 to 27.84% in 2025.

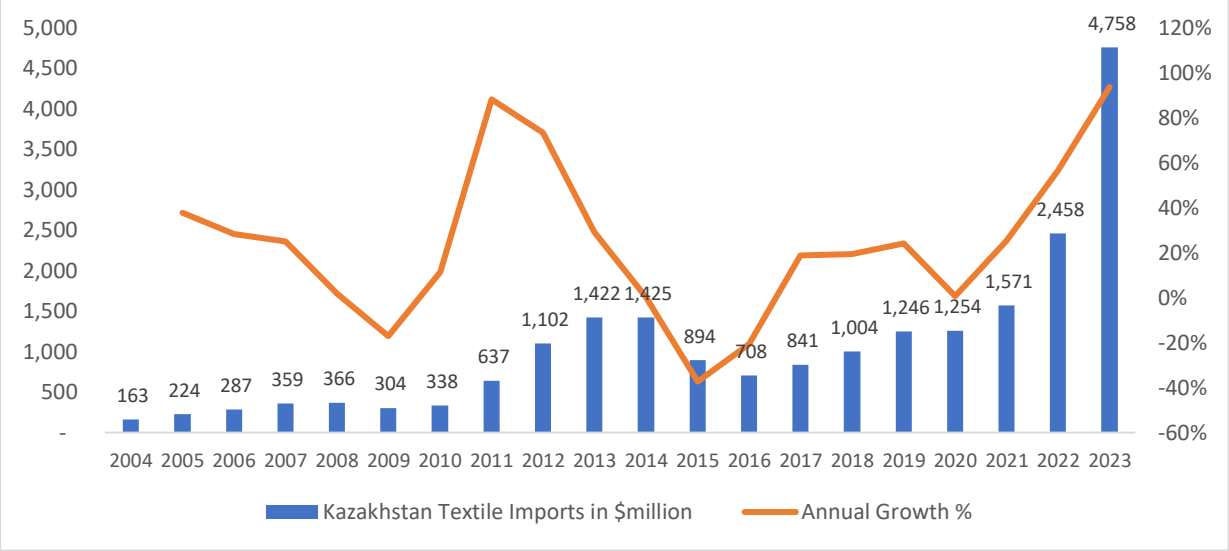
Kazakhstan's population growth has been steady, increasing from 15.01 million in 2004 to 20.29 million by 2025, fueling an expanding workforce. The labor force also grew from 8.29 million in 2004 to 9.81 million in 2023, with women constituting 48.25%, underscoring their significant role in the economy.

Foreign direct investment (FDI) has been volatile, with peaks of $16.82 billion in 2008 and $17.22 billion in 2016, followed by sharp declines. Despite fluctuations, FDI inflows rebounded to $5.44 billion in 2023.

Table 25: Textile Exports in $million

Kazakhstan's textile exports have seen fluctuating growth, with a compound annual growth rate (CAGR) of 2.53%. While exports grew to $304 million in 2023, global competitiveness remains a challenge.

Table 26: Textile Imports in $million



Textile imports soared to $4.76 billion in 2023, with a CAGR of 19.45%, highlighting rising domestic demand. The garment industry has experienced extraordinary growth, with garment exports surging by 377.90% in 2023 to $101 million. Garment imports, however, have seen even faster expansion, rising from $38 million in 2004 to $3.46 billion in 2023, achieving a CAGR of 26.79%. This reflects Kazakhstan's increasing reliance on imported garments and its potential to expand its domestic apparel sector.

Kenya

Kenya's economy has experienced steady growth with periodic fluctuations over the past two decades. GDP growth in constant prices peaked at 8.06% in 2010, followed by periods of stability between 4-6%. However, the global financial crisis in 2008 and the COVID-19 pandemic in 2020 resulted in economic slowdowns. The economy rebounded with 7.59% growth in 2021, and projections suggest GDP growth will stabilize around 5.02% in 2024 and 2025.

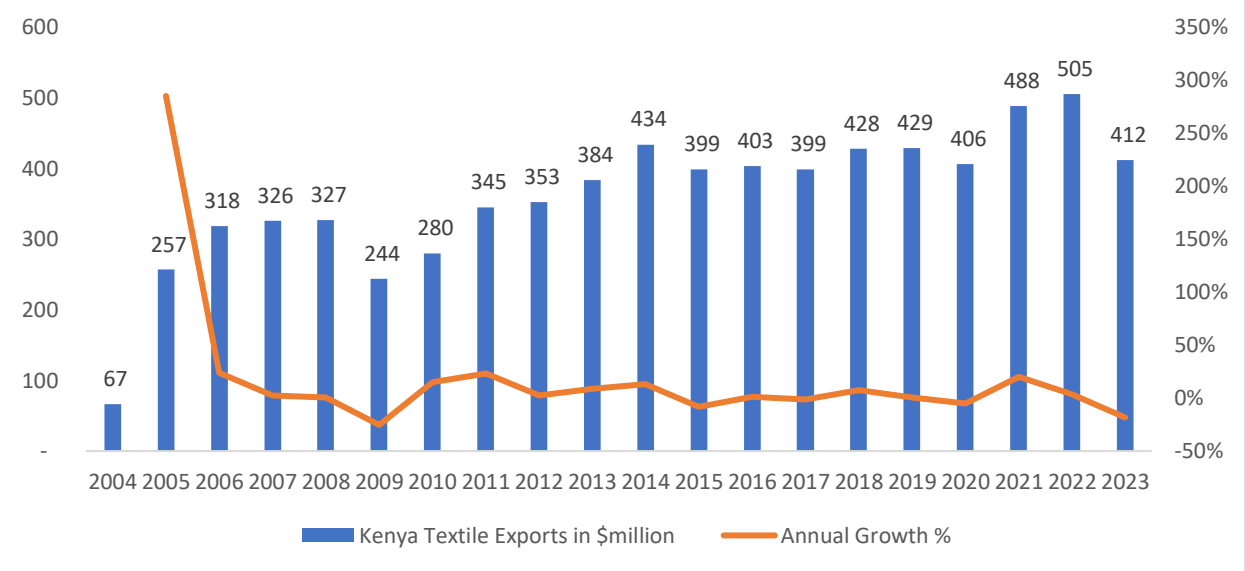
Kenya's GDP in current prices expanded significantly from $23 billion in 2004 to a projected $117 billion by 2025. While the economy has shown consistent growth, a slight decline in 2023 to $109 billion reflects external economic pressures. GDP per capita has followed a similar trajectory, rising from $693 in 2004 to a projected $2,187 by 2025, signifying improvements in living standards despite occasional declines.

Investment as a percentage of GDP has fluctuated, reaching at 24.96% in 2014 before declining. In 2023, investment fell to 16.36%, but projections for 2024-2025 indicate modest recovery, suggesting a cautious but optimistic investment climate.

Kenya's population growth has been steady, increasing from 32.9 million in 2004 to 53.35 million in 2025. Similarly, the labor force expanded from 14.03 million in 2004 to 25.52 million in 2023, with women making up 49.59%, highlighting gender inclusivity in the workforce.

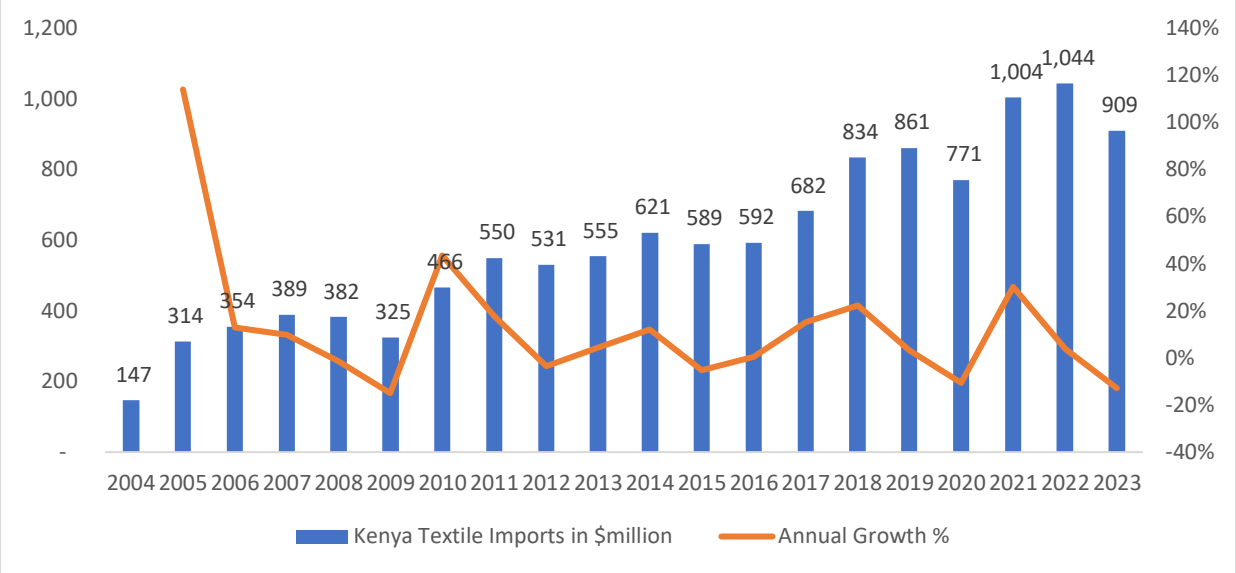
Foreign direct investment (FDI) has fluctuated significantly. FDI inflows peaked at $1.45 billion in 2011 but dropped to -0.01 billion in 2020 due to the COVID-19 pandemic. The economy rebounded with $0.79 billion in 2022.

Table 27: Textile Exports in $million



Kenya's textile exports have grown steadily, achieving a compound annual growth rate (CAGR) of 10.06%. Exports increased from $67 million in 2004 to $505 million in 2022 before contracting to $412 million in 2023.

Table 28: Textile Imports in $million



Textile imports have also risen, reaching $909 million in 2023, with a CAGR of 10.08%, indicating growing domestic demand. The garment sector has shown exceptional growth, with garment exports surging from $13 million in 2004 to $324 million in 2023. While exports dipped slightly in 2023, Kenya's share in global garment trade has expanded. Garment imports, meanwhile, increased from $10 million in 2004 to $143 million in 2023, with a CAGR of 15.15%, underscoring rising local demand for apparel.

Mali

Mali's economy has experienced fluctuations and resilience over the past two decades, shaped by economic volatility, investment fluctuations, and global market conditions. GDP growth has varied significantly, reaching at 7.09% in 2014, with contractions in 2012 (-0.84%) and 2020 (-1.24%) due to economic challenges and global disruptions. However, steady recovery is projected, with GDP expected to grow by 3.75% in 2024 and 4.36% in 2025.

GDP in current prices has steadily increased, rising from $5 billion in 2004 to a projected $23 billion in 2025. Despite a minor dip in 2022 ($18 billion), the economy is rebounding, reflecting stronger domestic activity and external trade. GDP per capita has also followed an upward trajectory, growing from $428 in 2004 to a projected $933 in 2025.

Investment as a percentage of GDP has been volatile, reaching at 24.04% in 2008, before declining to 17.19% in 2020. Despite modest rebounds in 2021 (21.27%), investment levels are projected to stabilize around 17.25% by 2025.

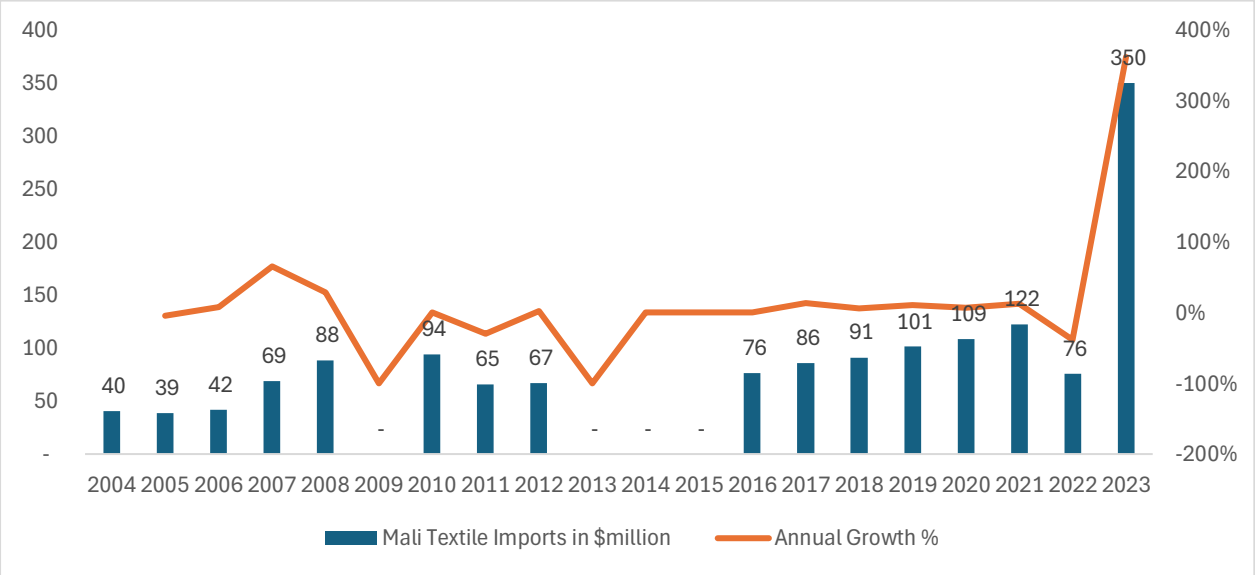
Mali's population has grown steadily, from 12.75 million in 2004 to a projected 24.88 million in 2025, reflecting demographic expansion. The labor force has also expanded, increasing from 4.94 million in 2004 to 8.53 million in 2023, with female participation at 38.22%, indicating progress in gender inclusion in the workforce.

Foreign direct investment (FDI) inflows have fluctuated significantly. From $0.08 billion in 2004, inflows peaked at $0.86 billion in 2019 before declining sharply to $0.02 billion in 2023.

Table 29: Textile Exports in $million

Mali's textile sector has seen significant volatility. Textile exports dropped from $366 million in 2004 to just $55 million in 2023, with several years of halted exports (2009, 2013-2015) indicating structural weaknesses. Despite occasional surges e.g., 2018: $476 million, the long-term trend is negative -9.46% CAGR.

Table 30: Textile Imports in $million



Textile imports, however, have increased significantly, surging 361.61% in 2023 to $350 million. Mali's garment sector remains underdeveloped but has growth potential. Exports have fluctuated significantly, reaching $0.46 million in 2023, though the sector remains a minor player in global trade. Garment imports, however, rose steadily from $10 million in 2004 to $24 million in 2023.

Mozambique

Mozambique's economy has demonstrated periods of strong growth, investment surges, and volatility over the past two decades. While GDP growth peaked at 9.91% in 2006, external shocks, political instability, and natural disasters led to a contraction in 2020 (-1.22%). The economy is recovering, with GDP growth reaching 5.44% in 2023 and projected to stabilize around 4.3% in 2024-2025.

Despite fluctuations, GDP in current prices has grown from $8 billion in 2004 to a projected $25 billion by 2025, reflecting economic expansion and investment-driven growth. However, GDP per capita has remained relatively low, reaching at $684 in 2014, before declining and projected to reach $685 in 2025.

Mozambique's total investment as a percentage of GDP has seen significant volatility, reaching at 56.4% in 2013, followed by fluctuations around 40-45% from 2019-2021.

The population has grown steadily, from 19.91 million in 2004 to a projected 35.84 million in 2025, creating a larger workforce and potential market. The labor force has expanded from 8.91 million in 2004 to 14.68 million in 2023, with a notably high female participation rate (52.5%), indicating strong gender inclusion.

Foreign direct investment (FDI) inflows peaked at $6.7 billion in 2013, but declined sharply after 2014, reaching $2.68 billion in 2023.

Table 31: Textile Exports in $million

Mozambique's textile exports have remained inconsistent, fluctuating from $34 million in 2004 to a peak of $107 million in 2013, before declining to $48 million in 2023.

Table 32: Textile Imports in $million

Textile imports have steadily increased, reaching $275 million in 2023. The garment sector remains underdeveloped. Exports have stagnated at $4 million in 2023, while imports have grown significantly, reaching $61 million in 2023.

Pakistan

Pakistan's GDP growth has fluctuated significantly over the years, with strong growth in the early 2000s reaching at 8% in 2005. Growth declined steadily, reaching a low of 1.06% in 2009. Between 2010 and 2018, the economy saw moderate growth, with a high of 6.1% in 2018. The COVID-19 pandemic caused a contraction of -0.94% in 2020, followed by a recovery in 2021 and 2022. However, GDP slightly contracted in 2023 (-0.21%), with projections indicating modest growth of 2.38% in 2024 and 3.2% in 2025.

GDP in current prices followed an upward trend from $132 billion in 2004 to $356 billion in 2018. A decline occurred in 2019 and 2020, but the economy rebounded to $375 billion in 2022 before dipping to $337 billion in 2023. Projections suggest a recovery to $375 billion in 2024. GDP per capita mirrored these trends, reaching at $1,698 in 2018 before declining in 2019-2020. After a recovery in 2021 and 2022, it dropped again in 2023 but is expected to rise in 2024.

Total investment as a percentage of GDP fluctuated, reaching at 18.28% in 2006 before gradually declining to 14.63% by 2011. It recovered slightly in 2018 (17.07%) but fell to 13.14% by 2024, with a modest projected increase to 13.60% in 2025. The population has grown steadily from 149.36 million in 2004 to 240.54 million projected for 2025, highlighting increasing demand for resources and infrastructure. The labor force has expanded from 50.56 million in 2004 to 82.19 million in 2023, with a low female participation rate of 22.9%. A large portion of the population (37.03%) is under 14 years of age, emphasizing the need for long-term employment strategies.

Foreign direct investment peaked at $5.59 billion in 2007 but declined significantly in subsequent years. After a modest recovery, FDI stood at $2.05 billion in 2023.

Table 33: Textile Exports in $million

Pakistan's textile exports have grown at a compound annual growth rate (CAGR) of 3.44%. Exports reached at $18.86 billion in 2022 before declining to $16.25 billion in 2023. Despite periodic downturns, Pakistan's share of global textile exports ranged between 1.63% and 2.01%, demonstrating competitiveness in the sector.

Table 34: Textile Imports in $million

Textile imports have also grown, with a CAGR of 5.78%, reaching at $4.68 billion in 2021 before dropping to $2.96 billion in 2023 due to economic pressures. Garment exports have steadily increased, with a CAGR of 6.16%, outperforming global averages. Exports peaked at $9.07 billion in 2022 before declining to $7.55 billion in 2023. Pakistan's share of global garment exports has ranged from 0.90% to 1.63%. Garment imports have shown a CAGR of 9.60%, reaching at $112 million in 2018 and 2021. However, imports declined in 2022 and 2023, settling at $62 million.

South Africa

South Africa's GDP growth has fluctuated significantly over the years. Between 2004 and 2007, the country experienced steady growth, reaching at 5.60% in 2006. However, the global financial crisis led to a sharp contraction of -1.54% in 2009. From 2010 to 2019, growth remained modest, fluctuating between 0.67% and 3.17%. The COVID-19 pandemic caused a severe contraction of -6.17% in 2020, followed by a strong recovery of 4.96% in 2021. Growth has since slowed, with projections indicating modest increases of 0.70% in 2023 and 1.49% in 2025.

South Africa's GDP in current prices increased from $256 billion in 2004 to a peak of $459 billion in 2011. The economy contracted to $323 billion by 2016 before rebounding to $405 billion in 2018. The pandemic caused GDP to fall to $338 billion in 2020, but it recovered to $421 billion in 2021. Forecasts suggest a gradual increase to $418 billion by 2025.

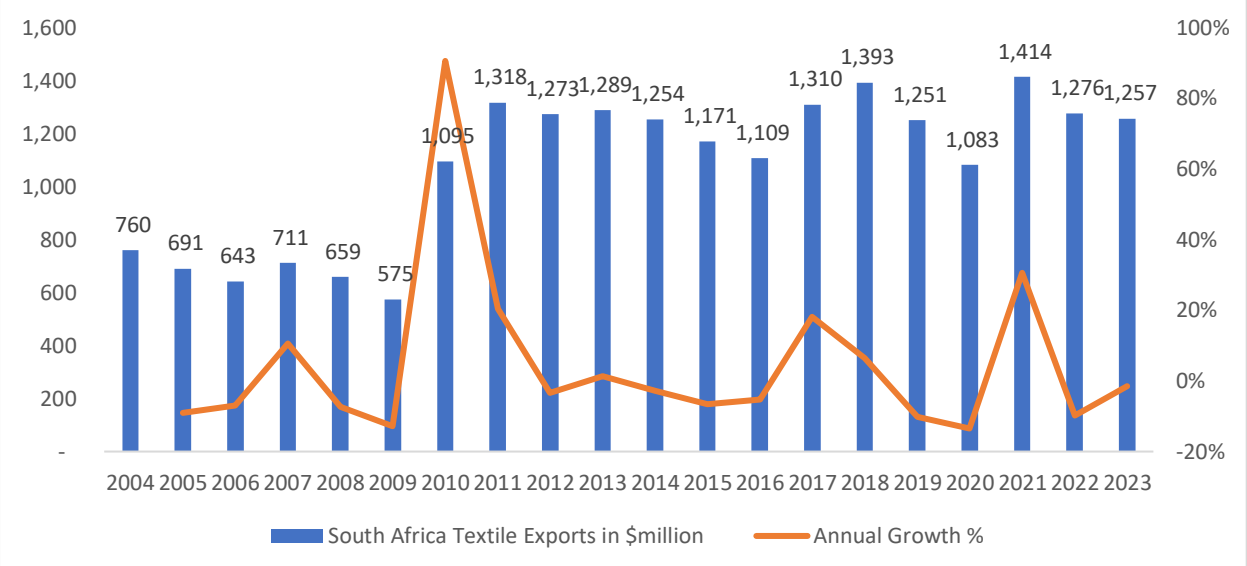
GDP per capita rose from $5,393 in 2004 to $8,785 in 2011 before declining to $5,631 in 2020 due to economic challenges. A recovery was observed in 2021, reaching $6,939. Despite some volatility, projections for 2025 estimate GDP per capita at $6,517.

Total investment as a percentage of GDP peaked at 21.29% in 2008 before stabilizing at around 18-19% until 2015. From 2016, investment levels declined, reaching 12.35% in 2020. A recovery trend began in 2021, with investment projected to rise to 15.71% by 2025.

South Africa's population has grown steadily from 47.51 million in 2004 to 60 million in 2020. Projections indicate continued growth, reaching 63.20 million in 2024 and 64.15 million in 2025. The labor force increased from 20.17 million in 2004 to 27.14 million in 2023, with women comprising 46.81% of the workforce.

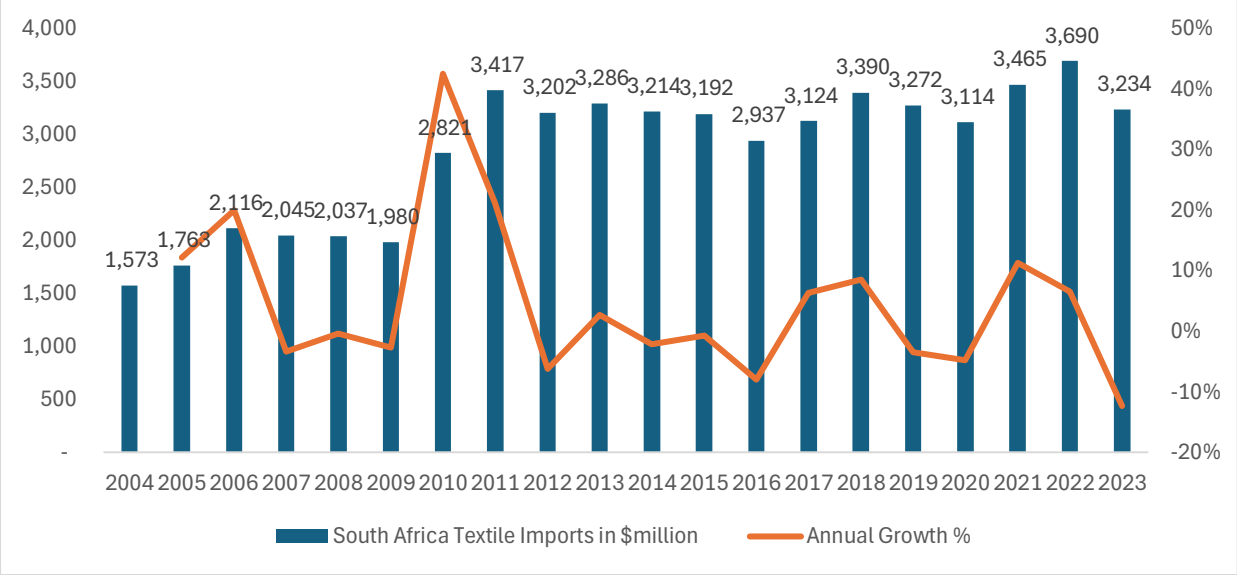
Foreign direct investment has fluctuated significantly. A record $40.66 billion inflow was recorded in 2021, compared to $3.15 billion in 2020. However, FDI declined to $9.24 billion in 2022 and further to $3.44 billion in 2023.

Table 35: Textile Exports in $million



Textile exports grew at a compound annual growth rate (CAGR) of 2.69%. Exports were valued at $760 million in 2004 but saw declines until a major recovery in 2010, reaching $1.10 billion. The sector experienced fluctuations but remained stable at $1.26 billion in 2023. South Africa's share of global textile exports ranged between 0.10% and 0.17%, reaching in 2010 and 2011.

Table 36: Textile Imports in $million



Textile imports grew at a CAGR of 3.87%. Imports increased from $1.57 billion in 2004 to $3.69 billion in 2019. A pandemic-related decline occurred in 2020, but imports rebounded, reaching at $3.69 billion in 2019 before stabilizing at $3.23 billion in 2020. The share of global textile imports ranged between 0.33% and 0.48%.

Garment exports exhibited a CAGR of 2.48%. Exports declined significantly between 2004 and 2009 before recovering in 2010 to $389 million. From 2011 to 2023, exports fluctuated, reaching at $454 million in 2011. Despite a strong recovery in 2021, exports fell to $390 million in 2023. South Africa’s share of global garment exports ranged from 0.03% to 0.11%. Garment imports grew at a CAGR of 6.35%. Imports rose from $564 million in 2004 to a peak of $2,058 million in 2022. A decline of 11.81% in 2023 brought imports down to $1,815 million. South Africa's share of global garment imports ranged from 0.22% to 0.46%, reflecting its role as a significant market within the global supply chain.

South Korea

South Korea's GDP growth has fluctuated over the years, reflecting shifts in domestic and global economic conditions. From 2004 to 2007, growth was steady, reaching at 5.84% in 2007. The global financial crisis led to a slowdown, with growth declining to 3.00% in 2008 and 0.82% in 2009. A strong recovery in 2010 saw GDP grow by 6.98%, followed by moderate growth rates between 2.31% and 3.69% from 2011 to 2019. The COVID-19 pandemic caused a contraction of 0.70% in 2020, but the economy rebounded with 4.61% growth in 2021. Growth has since slowed, with projections for 2024 and 2025 at 2.49% and 2.17%.

South Korea's GDP in current prices has grown steadily, rising from $823 billion in 2004 to $1.22 trillion in 2007. The 2008 financial crisis led to a decline, with GDP dropping to $1.09 trillion in 2008 and $983 billion in 2009. The economy rebounded to $1.31 trillion by 2011 and continued growing, reaching $1.71 trillion in 2017. After minor declines in 2019 and 2020, GDP recovered to $1.94 trillion in 2021. Projections for 2024 and 2025 suggest further growth, reaching $1.87 trillion and $1.95 trillion.

GDP per capita followed a similar trend, rising from $17,108 in 2004 to $25,075 in 2007. The financial crisis led to a decline, with GDP per capita falling to $22,291 in 2008 and $19,933 in 2009. Recovery followed, with GDP per capita reaching $26,178 in 2011 and reaching at $35,364 in 2018. After a dip in 2019 and 2020, the figure rebounded to $37,518 in 2021. Projections for 2024 and 2025 indicate further increases to $36,132 and $37,675.

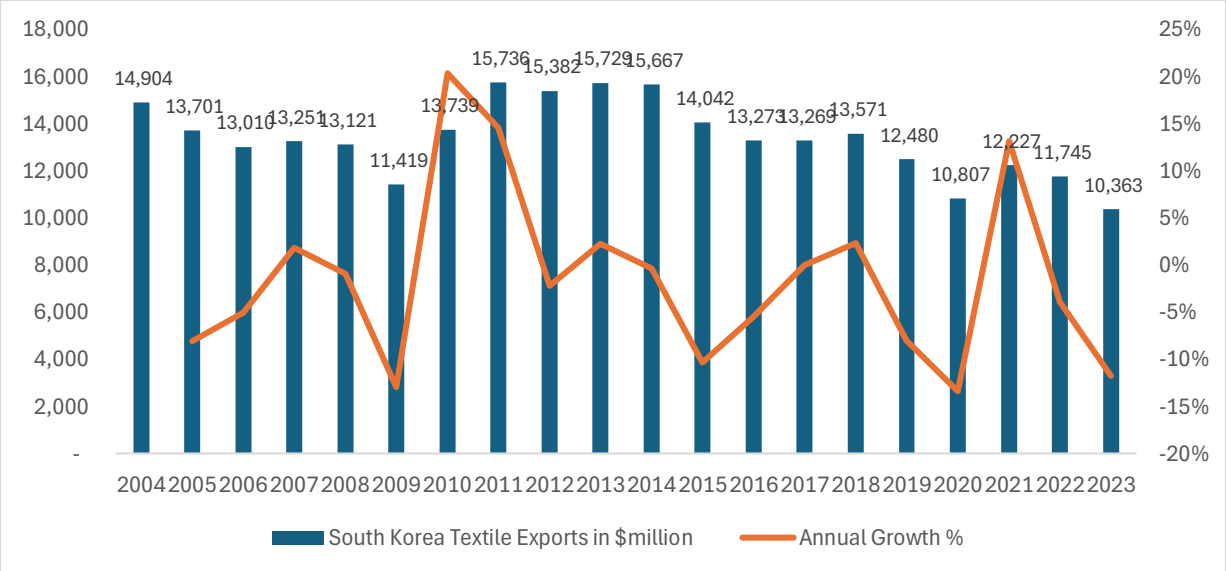
Total investment as a percentage of GDP remained stable, ranging from 32.69% to 33.70% between 2004 and 2008. The global financial crisis caused a dip to 29.56% in 2009, followed by a rebound to 33.26% in 2011. The ratio fluctuated between 29% and 33% in subsequent years, reaching at 33.33% in 2022. Projections for 2024 and 2025 indicate a slight decrease to around 31%.

South Korea's population grew from 48.08 million in 2004 to a peak of 51.84 million in 2020. Since 2021, the population has declined slightly, reaching 51.68 million in 2025, reflecting an aging population and lower birth rates.

The labor force expanded from 24.2 million in 2004 to 29.7 million in 2023, reflecting strong workforce participation. Women account for 43.45% of the labor force. The population aged 0-14 represents only 10.97% of the total, indicating a declining youth demographic.

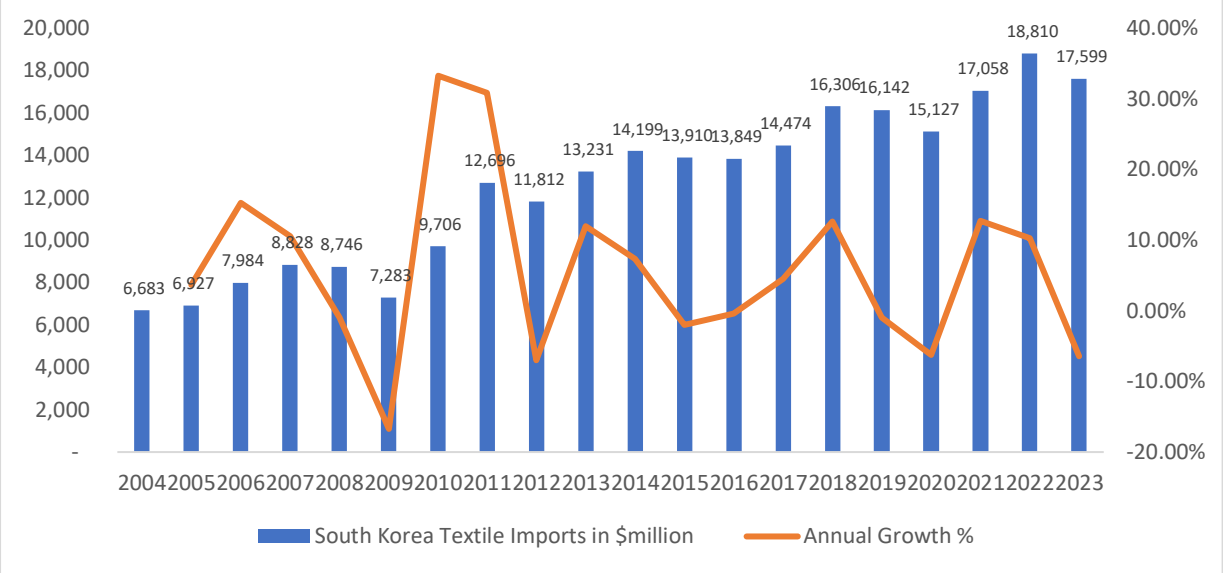
Foreign direct investment fluctuated over the years. FDI peaked at $13.64 billion in 2005 before declining to $4.10 billion in 2015. A surge in 2021 saw FDI reach $22.06 billion, followed by $25.04 billion in 2022. However, inflows declined to $15.18 billion in 2023.

Table 37: Textile Exports in $million



Textile exports declined at a compound annual growth rate (CAGR) of -1.89%. Exports fell from $14.9 billion in 2004 to $13.7 billion in 2005 and continued to decline through 2009. A recovery in 2010 saw exports grow by 20.32% to $13.7 billion. By 2011, exports reached $15.7 billion, but declines followed, with exports falling to $10.4 billion in 2023. South Korea's share of global textile exports dropped from 3.09% in 2004 to 1.18% in 2023.

Table 38: Textile Imports in $million



Textile imports grew at a CAGR of 5.23%, rising from $6.68 billion in 2004 to $17.60 billion in 2023. A significant decline in 2009 was followed by a strong rebound, with imports reaching at $18.81 billion in 2022 before slightly retracting in 2023. South Korea's share of global textile imports increased from 1.40% in 2004 to 2.29% in 2023.

Garment exports declined at a CAGR of -2.46%, falling from $3,112 million in 2004 to $1,938 million in 2023. The largest declines occurred between 2005 and 2009, with exports dropping by 59%. Recovery efforts between 2010 and 2014 saw exports peak at $2,033 million before stagnating. South Korea's share of global garment exports declined from 1.25% in 2004 to 0.38% in 2023. Garment imports grew at a CAGR of 8.39%, rising from $2,595 million in 2004 to $11,992 million in 2023. Growth was particularly strong between 2010 and 2014, with imports reaching $8,033 million. Despite fluctuations, South Korea's share of global garment imports increased from 1.00% in 2004 to 2.68% in 2023, reflecting rising demand.

Taiwan

Taiwan's economic growth has been marked by volatility, with GDP growth reaching at 6.85% in 2007 before contracting by 1.61% in 2009 due to the global financial crisis. A strong rebound in 2010 saw a 10.25% expansion, followed by moderate growth ranging from 1.47% to 4.72% through 2019. Despite the COVID-19 pandemic, Taiwan maintained resilience, with 3.39% growth in 2020 and 6.62% in 2021. Future projections estimate growth at 3.73% in 2024 and 2.67% in 2025.

Taiwan's GDP increased steadily from $347 billion in 2004 to $673 billion in 2020, peaking at $773 billion in 2021 before stabilizing at $756 billion in 2023. Projections indicate a rise to

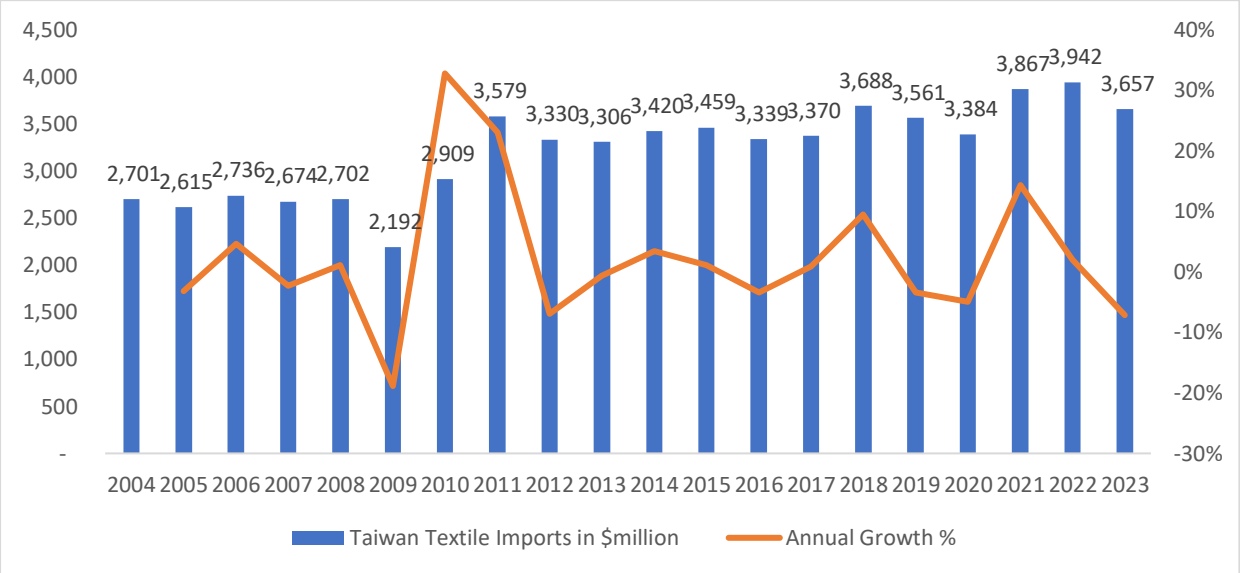
$775 billion in 2024 and $814 billion in 2025. GDP per capita followed a similar trajectory, reaching $33,071 in 2021, with expected growth to $34,924 by 2025.

Investment as a percentage of GDP fluctuated, dropping to 19.97% in 2009 before recovering to 28.15% in 2022. It is expected to stabilize around 26% by 2025. Population growth peaked at 23.60 million in 2019 before gradually declining to 23.32 million by 2023, with stabilization projected for 2025.

Table 39: Textile Exports in $million

Taiwan's textile exports declined at a -3.31% CAGR from 2004 to 2023, falling from $12.56 billion to $6.63 billion, with its global share shrinking from 2.60% to 0.75%.

Table 40: Textile Imports in $million



Textile imports grew at a 1.61% CAGR, reaching $3.66 billion in 2023, reflecting steady domestic demand. Garment exports saw a significant decline, with a -8.09% CAGR, dropping from $1.67 billion in 2004 to $336 million in 2023, reducing Taiwan's global share from

0.67% to 0.07%. In contrast, garment imports grew at 4.58% CAGR, rising from $945 million in 2004 to $2.21 billion in 2023, highlighting increasing consumer demand.

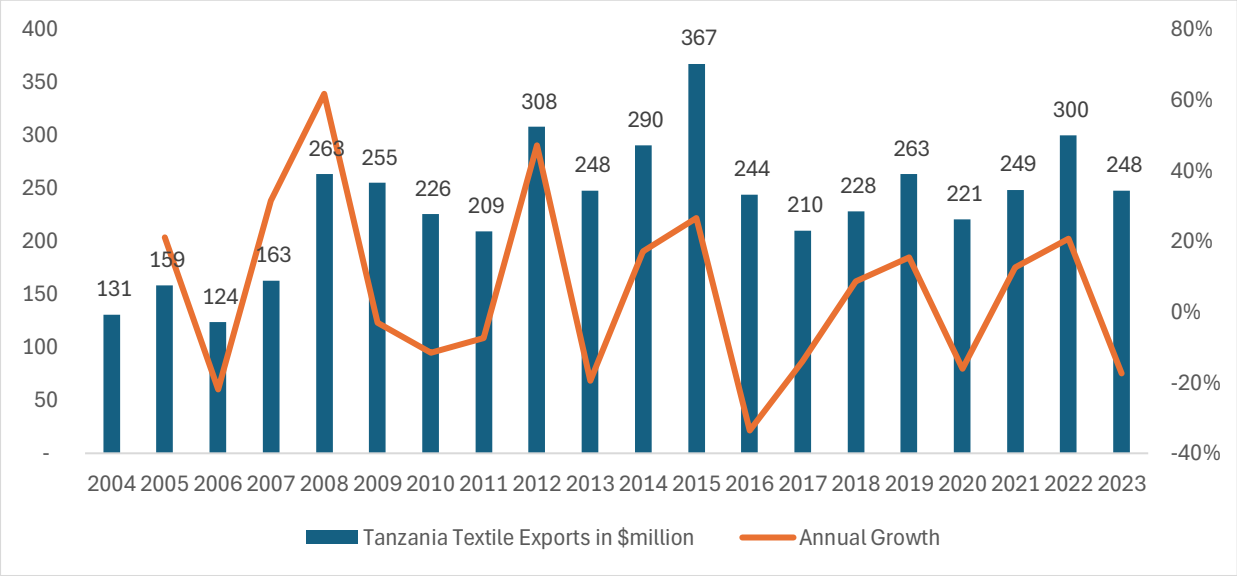
Tanzania

Tanzania's economy has demonstrated resilience and steady growth, with GDP increasing from $16 billion in 2004 to a projected $85 billion in 2025. Growth rates remained between 5% and 7% for most of the past two decades, with a temporary slowdown to 4.54% in 2020 due to the global pandemic. Economic recovery followed, with growth rebounding to 4.84% in 2021 and expected to reach 6% by 2025. GDP per capita has also steadily risen from $429 in 2004 to a projected $1,272 in 2025, reflecting improvements in living standards.

Investment as a percentage of GDP has fluctuated, rising from 27.95% in 2004 to 40.80% in 2021 before stabilizing at around 38% by 2025. The population has grown consistently from 36.31 million in 2004 to 67.18 million in 2025, contributing to an expanding labor force, which reached 31.05 million in 2023. Women account for 48.46% of the workforce, while 42.72% of the population is under 14, indicating a young demographic.

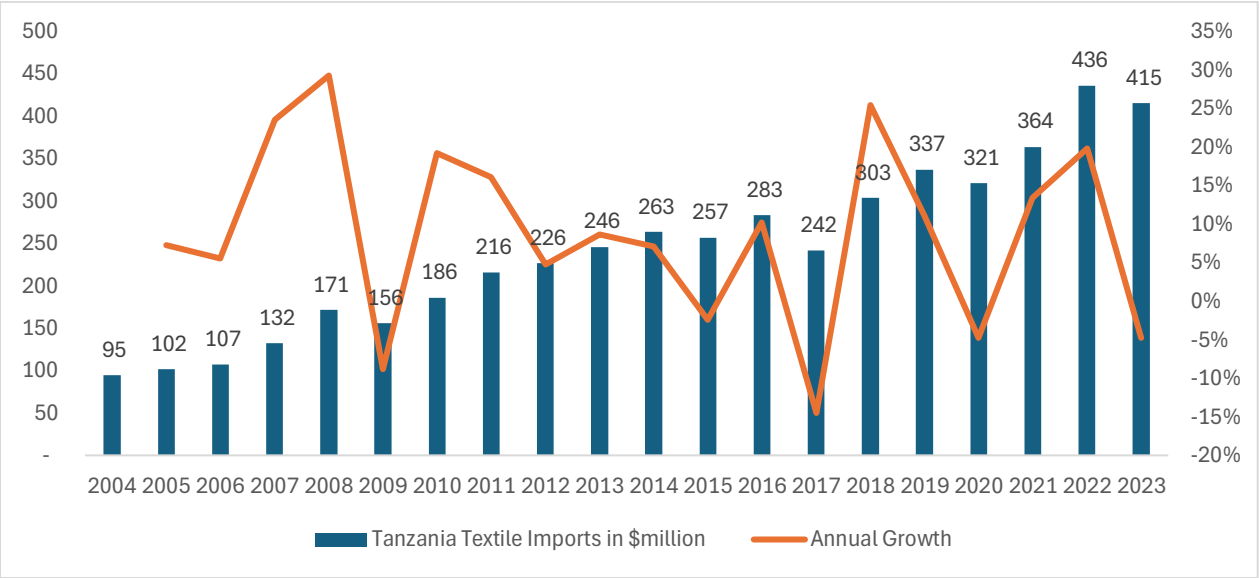
Foreign direct investment (FDI) inflows have varied, reaching at $2.09 billion in 2013 before stabilizing at $1.63 billion in 2023, reflecting Tanzania's ongoing efforts to attract foreign capital.

Table 41: Textile Exports in $million



Tanzania's textile exports grew at a 3.42% CAGR, rising from $131 million in 2004 to $248 million in 2023, maintaining a small but stable global market presence.

Table 42: Textile Imports in $million



Textile imports expanded at a higher 8.08% CAGR, reaching $415 million in 2023, reflecting increasing domestic demand. Garment exports grew at 8.37% CAGR, rising from $8 million in 2004 to $38 million in 2023, despite fluctuations. Garment imports exhibited even stronger growth at 10.53% CAGR, surging from $11 million in 2004 to $76 million in 2023, highlighting rising domestic consumption.

Türkiye

Türkiye's economy has demonstrated strong growth, with GDP increasing from $407 billion in 2004 to $1,130 billion in 2023, and projections reaching $1,455 billion by 2025. Despite a contraction of 4.82% during the 2009 financial crisis, the economy rebounded with 11.2% growth in 2011 and 11.44% in 2021. Growth rates for 2024 and 2025 are expected to moderate at 3.01% and 2.7%, respectively. GDP per capita rose from $5,985 in 2004 to $13,236 in 2023, with forecasts reaching $16,877 by 2025.

Investment as a percentage of GDP fluctuated, peaking at 35.04% in 2022 before stabilizing around 25% in 2025. Türkiye's population expanded from 68.01 million in 2004 to a projected 86.24 million in 2025, driving labor force growth from 22.78 million in 2004 to 35.59 million in 2023. Women comprise 33.34% of the workforce, while 21.83% of the population is aged 0-14, indicating a substantial youth demographic. Foreign direct investment (FDI) peaked at $22.05 billion in 2007 but fluctuated in subsequent years, settling at $10.95 billion in 2023.

Table 43: Textile Exports in $million

Türkiye remains a key player in global textiles, with exports growing at a 3.34% CAGR, reaching $32.87 billion in 2023, maintaining a 3.30%-3.80% global market share.

Table 44: Textile Imports in $million

Textile imports followed a similar trajectory, growing at 3.57% CAGR, reaching $12.23 billion in 2023. Garment exports grew at 2.82% CAGR, rising from $10.8 billion in 2004 to $18.3 billion in 2023, though global market share declined from 4.33% to 3.55%. Meanwhile, garment imports surged at 8.98% CAGR, from $577 million in 2004 to $2.96 billion in 2023, reflecting rising domestic demand.

Uganda

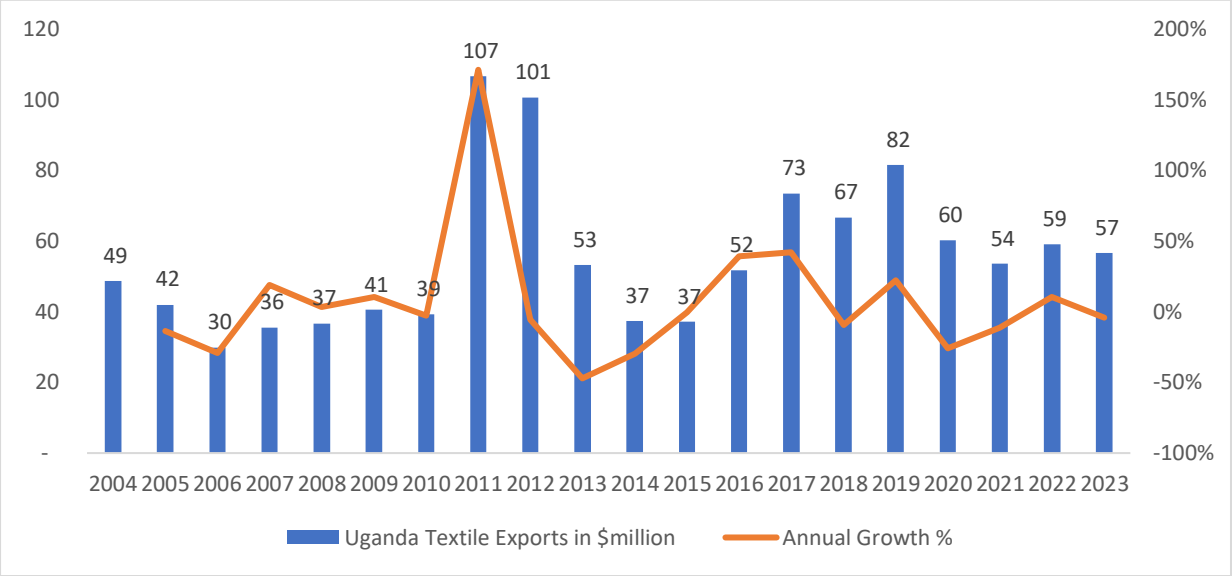
Uganda's economy has demonstrated steady growth, with GDP rising from $11 billion in 2004 to a projected $63 billion in 2025. Despite a contraction of 1.14% in 2020 due to the COVID-19 pandemic, Uganda rebounded with growth rates of 5.49% in 2021 and 6.29% in

2022. Projections for 2024 and 2025 stand at 5.88% and 7.45%, respectively. GDP per capita has similarly increased, from $431 in 2004 to an estimated $1,304 in 2025, reflecting improved living standards.

Investment as a percentage of GDP peaked at 28.95% in 2013 before stabilizing around 24% between 2018 and 2022. Projections for 2024 and 2025 indicate slight declines to 21.78% and 21.97%, respectively. Uganda's population has grown significantly, from 24.96 million in 2004 to a projected 48.25 million in 2025, fueling labor force expansion from 9.47 million to 19.08 million over the same period. Women account for 49.33% of the workforce, while 43.93% of the population is aged 0-14, signaling strong future labor market growth.

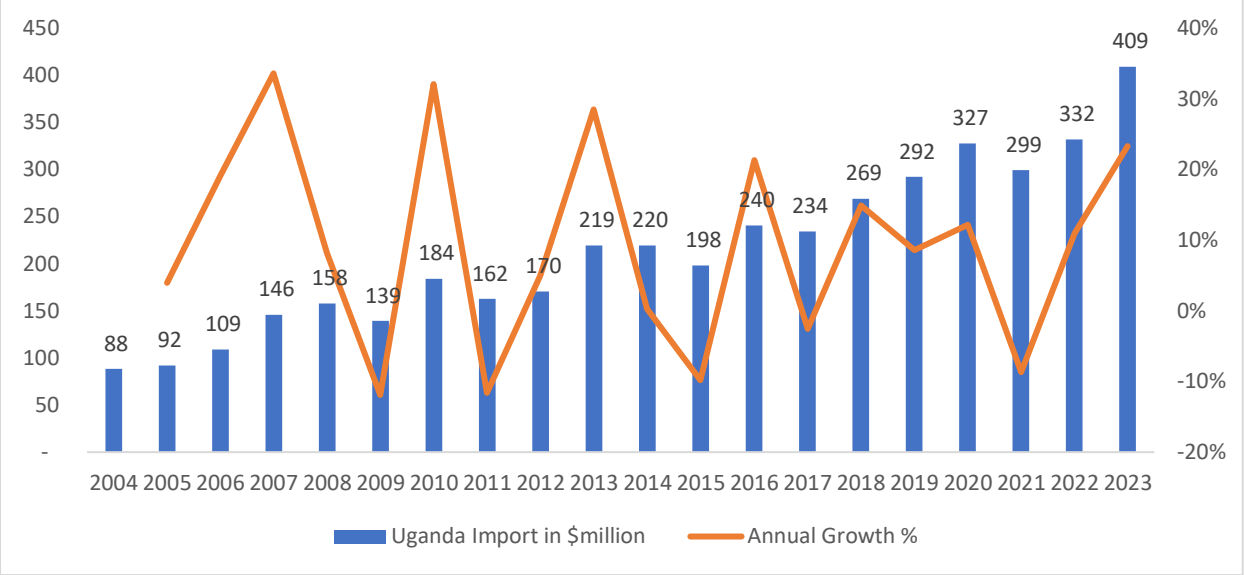
Foreign direct investment (FDI) has increased steadily, from $0.30 billion in 2004 to $2.99 billion in 2023, reflecting Uganda's attractiveness to investors and economic reforms.

Table 45: Textile Exports in $million



Uganda's textile exports have shown modest fluctuations, with a 0.80% CAGR, reaching $57 million in 2023. Despite a peak of $107 million in 2011, exports have remained relatively stable at 0.01% of global textile trade.

Table 46: Textile Imports in $million



Textile imports have expanded significantly, growing at an 8.41% CAGR from $88 million in 2004 to $409 million in 2023, reflecting rising domestic demand. Garment exports grew at a 2.77% CAGR, rising from $5 million in 2004 to $8 million in 2023, though global market share remained minimal. Conversely, garment imports surged at 7.53% CAGR, increasing from $20 million in 2004 to $79 million in 2023, driven by expanding consumer demand.

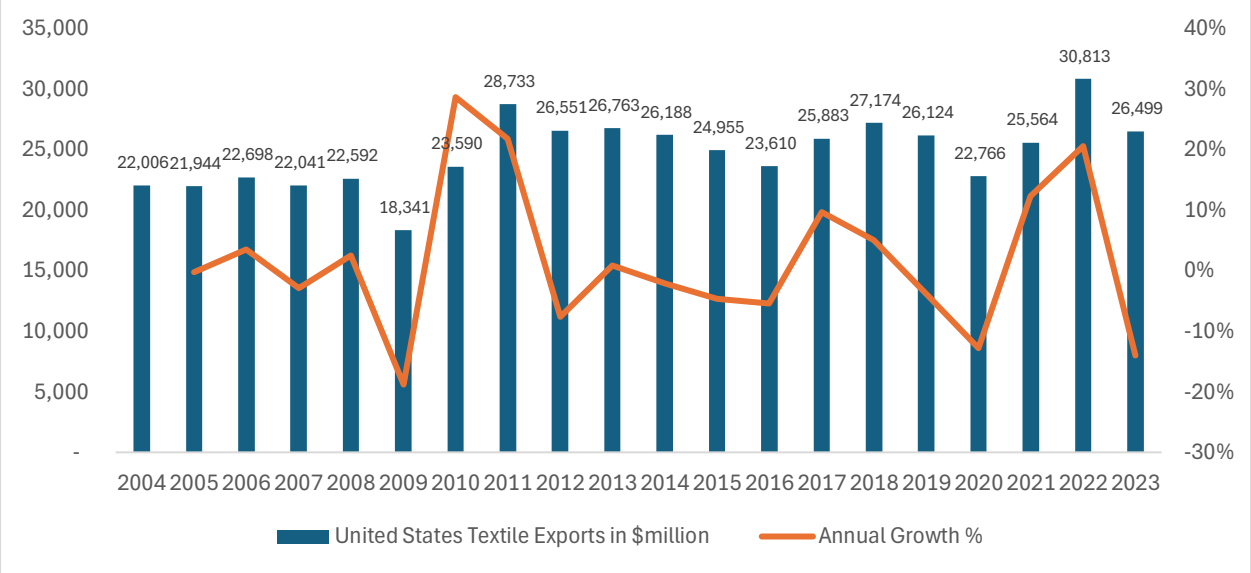
United States

The United States economy has demonstrated resilience and steady growth, with GDP increasing from $12.2 trillion in 2004 to a projected $30.3 trillion in 2025. Economic fluctuations have occurred due to major global events, including the 2008 financial crisis and the COVID-19 pandemic in 2020, which caused contractions of -2.58% and -2.16%, respectively. Strong recoveries followed, particularly in 2021 with 6.06% growth. Future projections suggest moderate expansion, with GDP expected to grow at 2.77% in 2024 and 2.15% in 2025.

GDP per capita has shown consistent improvement, rising from $41,642 in 2004 to a forecasted $89,678 in 2025. Investment as a percentage of GDP has remained stable, hovering around 21-22% in recent years. Meanwhile, the U.S. population has expanded from 293 million in 2004 to an estimated 338 million in 2025, with a growing labor force reaching 170.7 million in 2023. Women represent 45.65% of the total workforce, while 17.59% of the population is under 14.

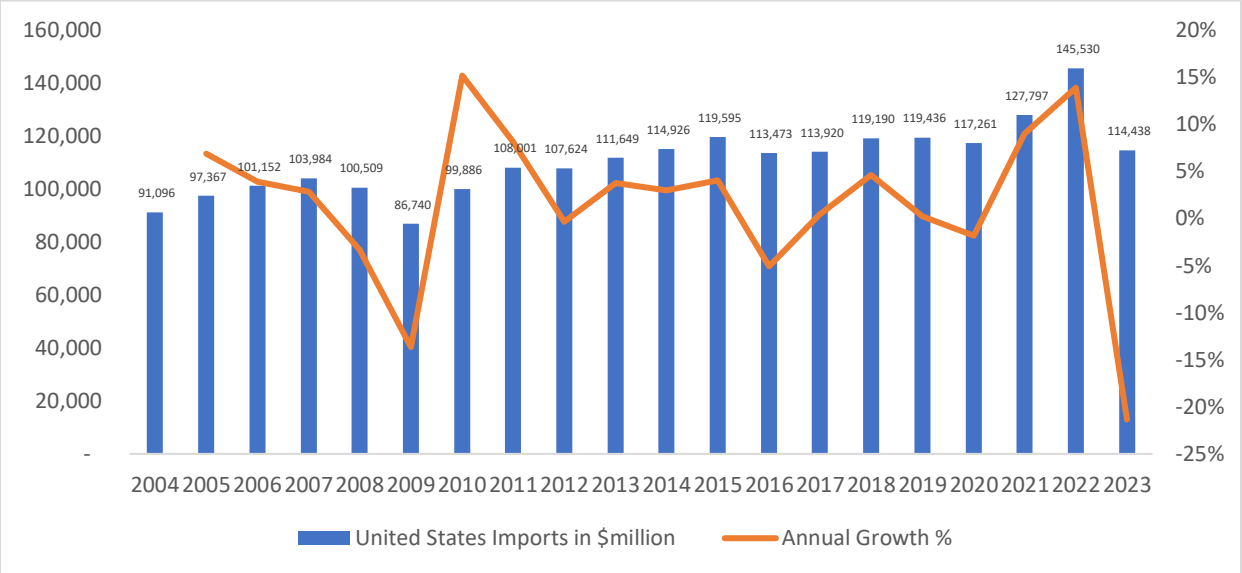
Foreign direct investment (FDI) inflows have fluctuated significantly, peaking at $511 billion in 2015, dipping to $137 billion in 2020, and rebounding to $475 billion in 2021. Inflows were estimated at $348 billion in 2023, reflecting strong investor confidence in the U.S. economy.

Table 47: Textile Exports in $million



The U.S. remains a key player in the global textile and garment industry. Textile exports grew modestly at a 0.98% CAGR, reaching $26.5 billion in 2023, though the U.S. share of global textile exports declined from 4.56% in 2004 to 3.01% in 2023 due to increasing international competition.

Table 48: Textile Imports in $million



Textile imports grew at a 1.21% CAGR, reaching at $145.5 billion in 2022 before declining to $114.4 billion in 2023. Garment exports have experienced slow but steady growth, with a CAGR of 1.63%, rising from $4.6 billion in 2004 to $6.2 billion in 2023. However, the U.S. share in global garment exports fell from 1.84% to 1.21% over the same period. Garment imports saw minimal growth at a 0.81% CAGR, reaching a peak of $105.4 billion in 2022 before dropping to $81.6 billion in 2023. The U.S. share of global garment imports declined from 27.03% in 2004 to 18.24% in 2023, though it remains one of the world's largest importers.

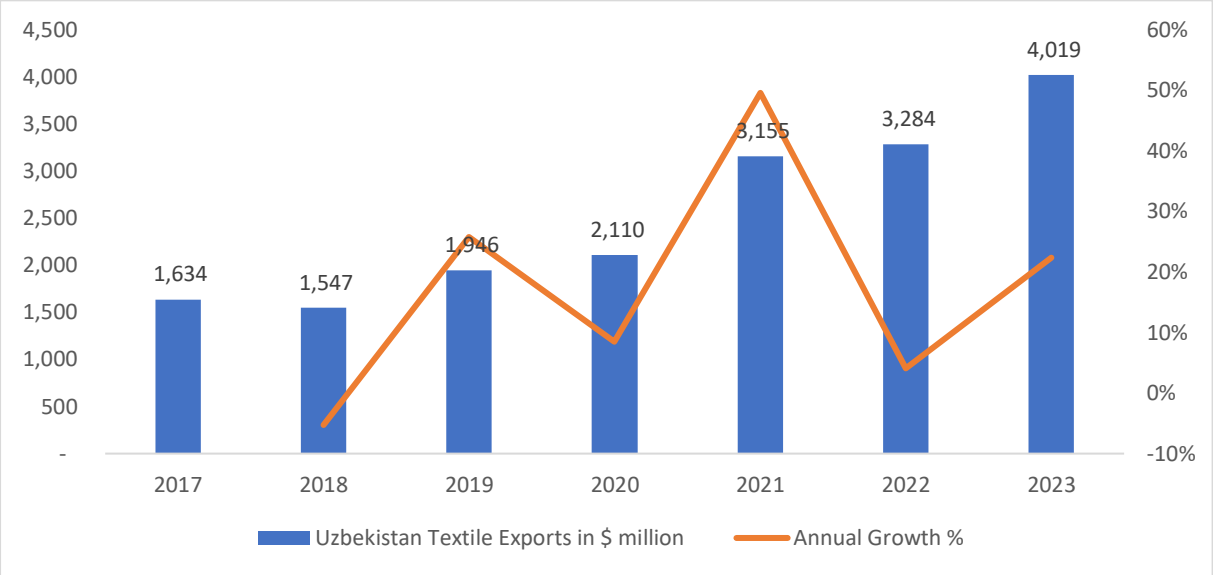
Uzbekistan

Uzbekistan's economy has demonstrated strong growth and resilience, with GDP increasing from $15 billion in 2004 to a projected $127 billion in 2025. Despite fluctuations, economic expansion has been steady, with GDP growth reaching at 9.5% in 2007, slowing to 1.56% in 2020 due to the pandemic, and rebounding to 8.04% in 2021. Projections indicate stable growth at 5.61% in 2024 and 5.71% in 2025.

Per capita GDP has steadily risen, from $585 in 2004 to an estimated $3,379 in 2025, highlighting improvements in economic output and living standards. Investment as a percentage of GDP has been consistently high, reaching 35.03% in 2025. Uzbekistan's population is expanding, projected to grow from 25.71 million in 2004 to 37.7 million in 2025, with an increasing labor force of 13.84 million in 2023, of which women constitute 35.67%.

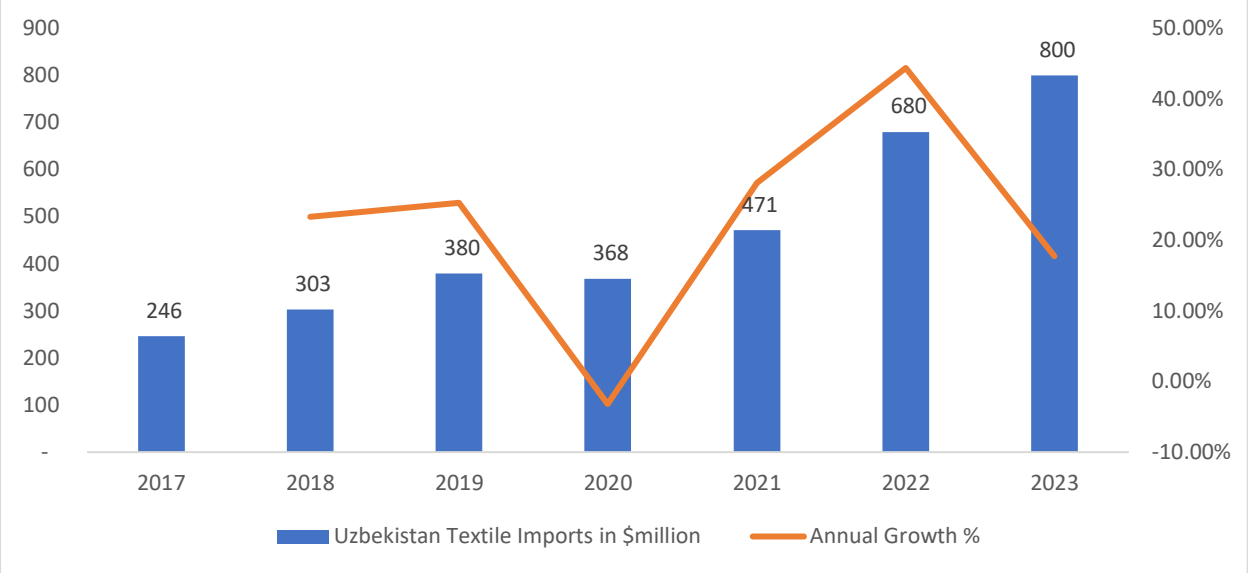
Foreign direct investment (FDI) has shown promising growth, increasing from $0.21 billion in 2005 to $2.66 billion in 2023, reflecting the country's improving investment climate.

Table 49: Textile Exports in $million



Uzbekistan's textile and garment sectors have experienced rapid expansion. Textile exports grew at a 16.19% CAGR since 2017, reaching $4.02 billion in 2023, capturing 0.46% of the global market.

Table 50: Textile Imports in $million



Imports have also surged, growing at 21.75% CAGR, reaching $800 million in 2023. Garment exports have been even more impressive, growing at a 29.22% CAGR from $269 million in 2017 to $1.25 billion in 2023, increasing the country's share in global garment exports from 0.06% to 0.24%. Garment imports have also risen significantly, growing at a 22.77% CAGR to $72 million in 2023.

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Kanwar Usman is the first-ever Head of Textiles at the ICAC and has 21 years of experience in the textiles value chain including production, teaching, retail brands and in government for policy formulation and implementation. Usman is a 1999 graduate of the textile engineering school at the National Textile University in Pakistan. The formative years of his practical experience were marked by a rewarding experience of working with Nishat Mills where he was also responsible for the installation of a spinning unit. He was a lecturer at the National Textile University and completed the MBA program at the University of East London.

Usman worked for Ministry of Commerce and Textile for 15 years and headed Research, Development and Advisory Cell and Textile Wing for 12 years. He formulated three textiles policies in Pakistan and also designed and operated many support schemes to promote trade and improve competitiveness in the textiles value chain. He currently serves as Head of Textiles at the ICAC.

A Publication from the

INTERNATIONAL COTTON ADVISORY COMMITTEE

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