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Review of the World Situation

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Global Textiles and Apparel Trade: A Post-Pandemic Review

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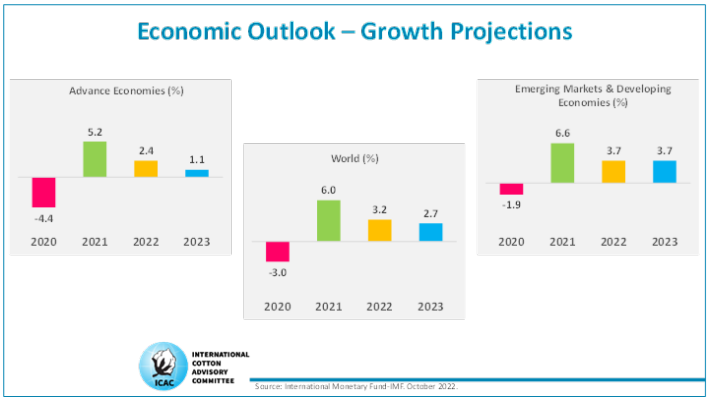
Textiles & Apparel (T&A) production and trade have been essential elements of economic activity and growth in many countries, as they provide millions of jobs and export revenues, especially in developing economies.

The decline and subsequent recovery of global economic activity during the Covid-19 pandemic severely disrupted the global T&A value chain, leading to a 5% drop in global T&A exports value to $782 billion in 2020, compared to $821 billion in 2019 — that is the lowest total since 2016 (US$751 billion). T&A products are considered 'non-essential'; therefore, clothing retailers and department-store chains had to close temporarily due to quarantines and lockdown measures imposed by governments in 2020.

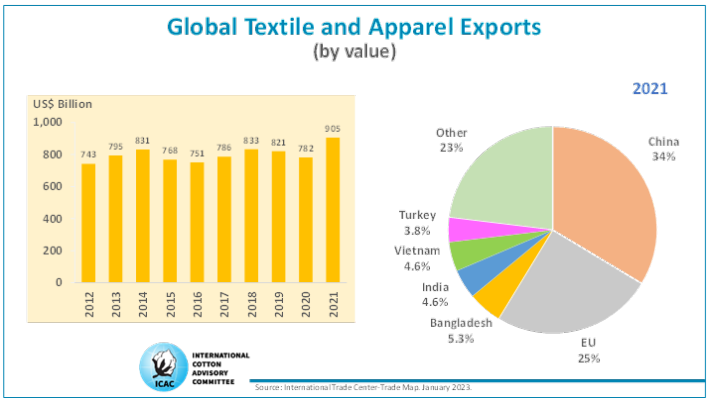
According to the IMF's World Economic Outlook, the world's economy bounced back as consumer spending increased in 2021. In its latest report, the organisation said that global economic growth increased by 6% in 2021 and 3.2% in 2022 although it is expected to slow down to 2.7% in 2023. However, the economic slowdown in China, together with global inflationary pressures and the conflict in Ukraine could result in weaker consumer spending, thus affecting the demand and trade for T&A products.

World T&A Trade Skyrocketed in 2021

In 2021, global T&A exports soared due to strong consumer demand. World T&A export value totalled $905 billion, up 15% from 2020. China, the European Union, Bangladesh, India,



Vietnam and Turkey remained the world's six largest T&A exporters in 2021, accounting for 77% of the world's T&A exports in 2021. China continued to be the world's largest producer and exporter of T&A, capturing nearly 34% of the global market share in 2021, with a value of approximately $304.7 billion — a record high — after posting a year-over-year increase of 9%. The top five partner markets to which China exported T&A products in 2021 were the European Union (18%), the United States (17%), Japan (6.3%), Vietnam (5.8%) and the Republic of Korea (3.2%).



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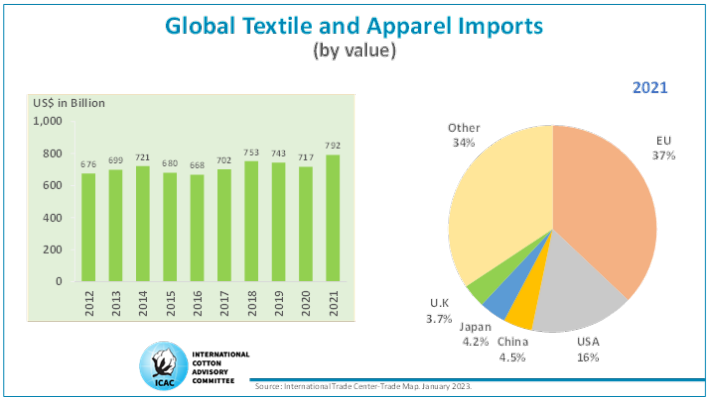
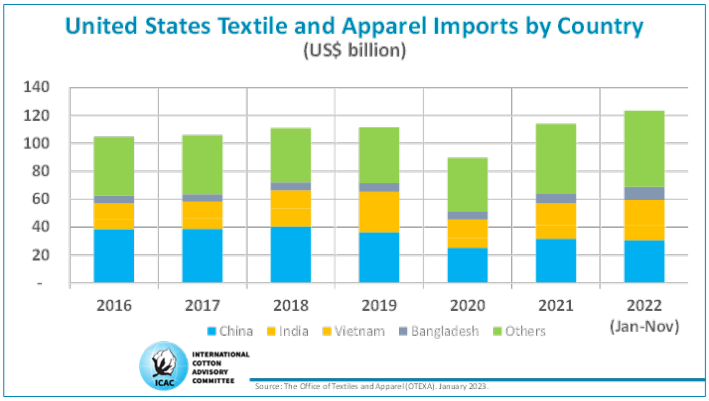
Global T&A imports stood at $792 billion in 2021, having grown at a CAGR of 1.8 % over the last decade. Apparel products had a larger share than textiles products in the overall trade with 55% and 45%, respectively. The United States, the European Union, China and Japan remained the world's four largest T&A importers in 2021. Together, these four accounted for 62% of the world's textile imports in 2021, similar to pre-pandemic levels.



China remained a vital T&A sourcing country for the USA, in spite of section 301 punitive tariffs levied against Chinese products[1] and the Uyghur Forced Labor Prevention Act (UFLPA)[2], which was signed into law on 23 December 2021. According to the latest trade statistics report from the Office of Textiles and Apparel (OTEXA), China still accounted for nearly 28% of total US T&A imports in value in 2021 ($114 billion). Nevertheless, China's T&A exports to the United States have decreased over the past five years, falling from $38.7 billion in 2017 to $31.6 billion in 2021 (-18%). China's market share has also shrunk nine percentage points. Meanwhile, T&A exports to the USA from other South and East Asia countries have increased over the same period — Vietnam (+$3.3 billion), India (+$2.5 billion) and Bangladesh (+$2.1 billion).

The data for cotton products imported by the United States shows that total import values increased by 32%, from $37 billion in 2020 to $49 billion in 2021. China's market share in total US cotton products imports has fallen significantly from 29% in 2016 to 17% in 2021. In the first eleven months of 2022, the USA has increased the total import value of cotton products,



from $44.8 billion in 2021 to $53 billion in 2022, up 19%. Only 15% of US cotton products imports came from China, while India, Vietnam and Bangladesh combined accounted for 39% of the total.

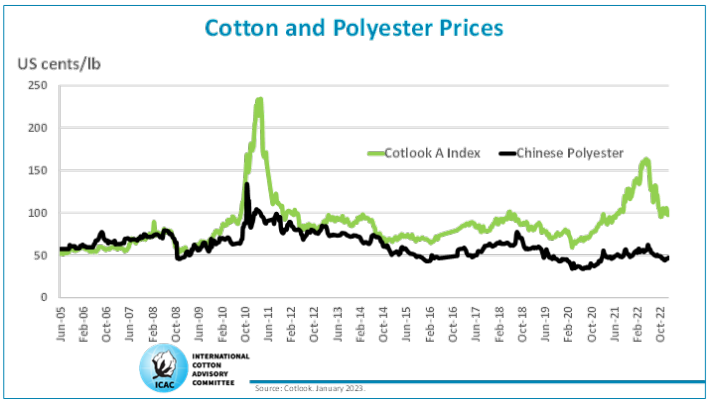
1Congressional Research Service. Section 301 Tariff Exclusions on US Imports from China. Updated January 3, 2023. https://crsreports.congress.gov/product/pdf/IF/IF11582. The United States government.

2 The United States government. US Customs and Border Protection (CBP). Uyghur Forced Labor Prevention Act. https://www.cbp.gov/trade/forced-labor/UFLPA

Prices for Cotton and Polyester

Prices often increase and decrease at different rates depending on the type of fibre. International cotton prices, as measured by the Cotlook A Index, decreased by a cumulative 23.4% between 2014 and 2015, before increasing by a cumulative 27% between 2016 and 2018. Cotton prices decreased by 15% to 171.5 cts/kg in 2019 and by 7% more to 158.7 cts/kg in 2020. International cotton prices increased by 41% to 101.5 cents per pound in 2021 and by 28% to 129.7 cents per pound in 2022.

Between 2005 and 2007, the average relative price of cotton to polyester was 0.87, indicating that cotton was about 13% cheaper than polyester. In 2010 and 2011, the relative price of cotton to polyester increased first to 1.7 and then to 1.92, meaning that cotton became 70% and 92% more expensive than polyester in those two years. In 2012, both cotton and polyester prices declined, and although cotton prices declined by a larger proportion (42% vs. 16%), they remained 32% higher than polyester prices in 2012, damaging cotton's competitiveness. Between 2013 and 2016, the relative price of cotton to polyester increased from 1.4 to 1.8 before decreasing to 1.72 in 2017 and then to 1.67 in 2018. The relative price of cotton to polyester increased to 1.73 in 2019 and 2.04 in 2020 before decreasing to 1.97 in 2021. For 2022, the relative price of cotton to polyester reached 2.28 — the highest spread on record. Since 2007, cotton prices have remained higher than polyester prices, inhibiting a more rapid expansion in global cotton consumption.



World Café 2022 Convenes Experts to Address 'The Evolving Global Textile Supply Chain'

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When dealing with a topic as challenging as the constantly shifting global textile supply chain, the more brainpower you have, the better. Considering the entire planet is still suffering from the chaos caused by the Covid-19 pandemic, which had different impacts and different parts of the world, it's also critical to get a variety of perspectives from across the globe.

That's why the ICAC chose the World Café as the ideal forum to discuss 'The Evolving Global Textile Supply Chain' during its 80th Plenary Meeting, held 29 November – 1 December 2022. Unique among Plenary Meeting sessions, the World Café focusses on the thoughts and opinions of audience members rather than a couple of presenters, thus delivering suggestions and insights from a geographically and culturally diverse group of cotton and textile professionals.

Prior to the event, five globally recognised supply chain experts from different regions addressed a common set of questions in group discussions with their peers:

1. Dr Marcelo Paytas, Director of INTA (Argentina),
2. Dr Marcelo Duarte, Director of International Relations, Abrapa (Brazil),
3. Manish Daga, Founder of CottonGuru (India),
4. Bilal Jameel, Zonal Chairman of the All Pakistan Bedsheet and Upholstery Manufacturers Assn (Pakistan), and
5. Marzia Lazfranchi, Intelligence Director, Transformers Foundation (USA).

Together, there were a total of 27 industry experts participating in the 2022 World Café. The questions they all discussed are listed below, along with highlights of the discussions they held. A video of the entire World Café session held on 1 December 2022, including summary videos from each of the experts listed above, is available here in Arabic, English, French, Russian and Spanish.

Question 1: ***What are the emerging trends in the global textile supply chain including e-commerce?***

Argentina: It seems obvious but it's so critical to success: The most important trend is that people are becoming much more aware of the impact their fashion choices have on the environment. Without that, there would be no movement at all. In addition, e-commerce is becoming a much bigger factor in a post-pandemic world.

Brazil: The group identified six areas — circularity, traceability, slower fashion, regulation, geographical diversification and geopolitics — and added that the potential impacts of a global recession should be added to the list.

India: The support of governments will be crucial because manufacturers need to balance the cost-benefit ratio of sustainability initiatives, especially in a price-elastic country like India. The changes will happen faster in developed countries so support must be provided in less developed countries to help them maintain their competitiveness.

Pakistan: Competition will continue to be cutthroat so the winners will be exporters whose countries work with them to keep costs down and provide a competitive advantage. The fallout from China's zero-Covid policy will continue to drive buyers to diversify their supplier portfolios.

USA: It appears that people are finally talking about applying numbers to sustainability initiatives, so communication becomes increasingly important. The ability to impart science-based information to consumers in a compelling and easily understood way is a looming challenge.

Question 2: ***How we can improve sustainability in textile value chain?***

Argentina: Improvements in technology are a primary driver, especially ones that make processes easier and less expensive. Transparency and clarity also seem to be improving throughout the supply chain and that will have a big impact as long as it continues.

Brazil: The need for clear measurement methodology and indicators was made very obvious. What do we measure, and

how? The use of more biodegradable products, like those made from cotton, also will be critical to maintaining a healthy environment.

India: Coordination and communication are the first two efforts that must be undertaken. Making the global textiles industry more sustainable is a job for everyone, not just one or two sectors, and so any solutions that are developed must incorporate the needs and requirements of all stakeholders.

Pakistan: The most efficient way to improve sustainability across the value chain would be through partnerships between buyers and suppliers. We need long-term buying commitments so manufacturers can invest in new green technologies. Importantly, buyers should share in those costs.

USA: The name of the game here is transparency and traceability. It's going to be difficult to make significant gains in overall sustainability if we can't trace fibres back to their origin. Improving the longevity and useful lifespan of clothing and fabrics would also be a major step forward.

Question 3: ***As the markets are being taken over by big retailers in the developed countries, what is the future of Small and Medium Enterprises (SMEs) in the textiles value chain, especially in export markets?***

Argentina: The greatest opportunities for SMEs likely will lie in niche markets where they can specialise their production and develop highly targeted marketing plans. Governments also must ensure their policies are developed with the needs of SMEs as a priority.

Brazil: To survive in this ultra-competitive new world, smaller enterprises will need to focus on value-added and niche markets where their agility and ability to shift operations quickly can offset their lack of significant resources.

India: SMEs will have to be much more selective and strategic in their operations. If they cannot compete with the wealth and reach of the global brands, then they must find niche markets where they can provide expertise and customer service that multinationals can't match. They also must be very vigilant about managing costs because their limited resources don't provide much room for error.

Pakistan: Both exporting and importing countries need to make policies that promote and support SMEs. The biggest hurdles for developing countries are access to finance and meeting the often-expensive compliance requirements of importing companies.

USA: While they lack to the resources of their giant competitors, SMEs are the true agents of change. They innovate, adopt technologies like traceability more quickly and have a tremendous impact on design and fashion. The role they play is critical and SMEs should never be overlooked just because there are bigger businesses out there.

Question 4: ***Traceability is an increasingly important factor but the textiles value chain is long and complex. How it can be simplified and made less expensive?***

Argentina: Traceability will be an important tool going forward but faster returns could be found by simplifying the primary production process. It is a challenge particularly for countries that import fibre from other regions.

Brazil: It's a basic answer, but further research is the key — especially research into making the technologies more affordable. Costs are a major factor and if new technologies are too expensive, SMEs will be the first to abandon them.

India: There is little understanding of what the 'true cost' of various sustainability initiatives actually is, and that lack of transparency must be addressed. It is impractical for only one sector of the supply chain to bear all of the costs of making textiles more sustainable but we can't share that burden until we know exactly what it is.

Pakistan: Sustainability, circularity and traceability are interconnected and important topics for the entire world. The

creation of a sustainability index and traceability system would be a huge benefit for the textiles value chain, especially if it came from a non-profit organisation.

USA: There are a lot of potential solutions out there today, and there probably never will be a 'single answer' that works for everyone. That's fine but none of the solutions will work for anyone unless we come to an agreement on what traceability and transparency actually are, and that discussion hasn't happened yet.

Question 5: ***Audit fatigue is a real concern, especially with the need to meet not only domestic legislative requirements, but also the compliance requirements of global brands. How can we simplify the audits?***

Argentina: It might be too much to ask farmers to comply with local regulations and requirements while also having to meet those of global brands and retailers. Audits undertaken at the industrial level would be easier to implement because they are standardised, and because there are so many factors to consider in primary production, from procuring the seed through harvesting.

Brazil: Consolidation is the key here. The goal should be to compile a list of common requirements to streamline the process. Abrapa and the Better Cotton Initiative, for example, worked together to combine their requirements and eliminate the need for farmers to be audited twice.

India: Simply, this must be resolved so audit requirements are consistent across regions and sectors. Having to redo audits is devastating to businesses because they require both money and time to conduct. Achieving a common set of requirements is just a matter of will — it can be done as long as we commit to doing it, which unfortunately hasn't happened yet.

Pakistan: It is simple: There must be an effort to develop a single, uniform audit to reduce cost and avoid duplication. This can be done if the desire to do it is there — and it must be, or SMEs must collapse under the weight and cost of multiple audits.

USA: Greenwashing is having a detrimental impact in this area because companies are looking for way to make their operations look more environmentally friendly. If their numbers are strong in a particular area, they are going to emphasise that area in their initiatives because it makes them look better, not necessarily because it's effective or beneficial.

Question 6: ***Going forward, what role do you see the ICAC playing in the global textiles industry? What would you like to see us do to better support cotton-consuming countries?***

Argentina: Continuing to provide technical information is a given, and taking an even more active role in guiding policy development in cotton producing and consuming countries would be a good next step.

Brazil: It was suggested that the ICAC should use its reach and influence to identify and support effective legislation, help to unify sustainability standards and methodologies, and continue to promote cotton as a natural and renewable fibre.

India: The ICAC could provide global standards and a set of technical details that would help countries benchmark themselves against the rest of the world and see where they need to improve. The technical information that the ICAC has been providing for decades has been extremely valuable and that same level of detail can also be applied to textiles.

Pakistan: First, the ICAC can help SMEs find new buyers and suppliers to facilitate their access to the global value chain. Second, ICAC should arrange business-to-business delegations to help businesses find new partners to increase our trade. Third, providing access to research is very important because industry-academia linkages are very weak. Finally, we need support in carrying out the compliance audit requirements of international buyers.

USA: It's ambitious but the ICAC needs to commit to a timeframe — be it 5 years or 10 years — to develop a framework that every cotton farmer can use to measure their environmental impact. This information already exists in the farmers' heads but we need to get that data into our systems so we can measure it.

Understanding the Product Environmental Footprint (PEF)

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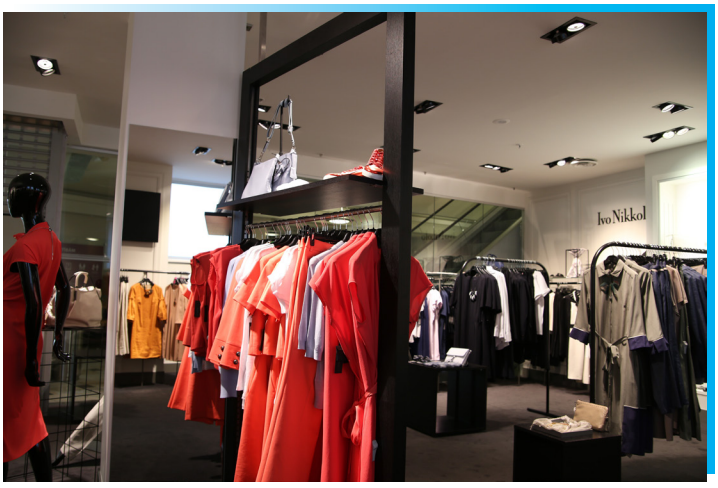
According to the United Nations Alliance for Sustainable Fashions, the textile industry:

- Contributes $2.4 trillion to global manufacturing,
- Employees 300 million people worldwide (mostly women),
- Is estimated to produce 2%-8% of world's greenhouse gas emissions,
- Consumes 215 trillion litres of water per year,
- Accounts for approximately 9% of annual microplastic losses to oceans, and
- Suffers from an annual material loss of $100 billion due to underutilisation.

Therefore, the textile industry is one of global importance, providing economic growth, high levels of employment, foreign exchange revenue and countless products essential to human welfare. However, addressing the circularity and sustainability of the sector is crucial because the world is producing and consuming more textiles than ever before, and the current very low reuse and recycling rates mean that more textiles are also being thrown away than ever before. This requires ever more land, water and fossil fuels, resulting in increasing pollution of the air, water and soil — not only damaging the environment but also harming the health of textile workers and communities.

A shift to circular models is critical in delivering sustainability for the industry and will require a global approach with an entirely new vision and radically different ways of doing business. This can only be achieved through the mobilisation of actors across regions and at all levels of the textile value chain. Moving the textile value chain toward greater sustainability and circularity requires enabling systems that address the very design of textile products, accompanying aspirations, business models and customer offers, as well as interventions targeting specific value chain stages and the hotspots that occur in those — and above all, the importance of changing consumption habits.

Given its size and global reach, unsustainable practices within the fashion sector have important impacts on social and environmental development indicators. Without major change to production processes and consumption patterns in fashion, the social and environmental costs of the sector will continue to mount.



However, we need a baseline to measure the parameters to ascertain the environmental claims and there is always a need to create a common language and method for calculating a product's environmental footprint, which is the foundation for a set of specific rules. Moreover, we must establish the basis for verified and trustworthy sustainability claims to prevent companies from greenwashing.

Over the last two decades, the European Commission has been working to incorporate 'life cycle thinking' in European product policies. The life cycle approach has become a major lever for guiding European policies and investments toward environmental sustainability goals. The Product Environmental Footprint (PEF) and the Organization Environmental

Footprint (OEF) are life cycle assessment (LCA)-based methods to measure and communicate the potential life cycle environmental impact of products (goods or services) and organisations, respectively. Together they form the basis for the EU Environmental Footprint. It builds on existing approaches and international standards. The overarching purpose of PEF information is to reduce the environmental impacts of goods and services by taking into account supply chain activities from the extraction of raw materials, through production and use, and then to final waste management. This purpose is achieved through the provision of detailed requirements for modelling the environmental impacts of the flows of material/energy and the emissions and waste streams associated with a product throughout its life cycle.

Table 1: ***Timeline of the main milestones in life cycle supported policy making in the European Commission***

2021	Communication on Pathway to a Healthy Planet for All – EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil' COM/2021/400
2020	EU Biodiversity Strategy for 2030 – Bringing nature back into our lives COM/2020/380
2020	A Farm to Fork Strategy for a fair, healthy and environmentally friendly food system COM/2020/381
2020	A new Circular Economy Action Plan – For a cleaner and more competitive Europe COM/2020/98 |
2019	Communication on The European Green Deal COM/2019/640
2019	• Environmental Footprint transition phase (2019-2022) • Methodological developments of the Environmental Footprint
2015	Communication on Closing the loop – An EU action plan for the Circular Economy COM/2015/614
2013	• Environmental Footprint pilot phase (2013-2018) • Methodological developments of the Environmental Footprint
2013	2013/179/EU: Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations – the Environmental Footprint methodology
2013	Communication on Building the Single Market for Green Products – Facilitating better information on the environmental performance of products and organizations COM/2013/196
2011	Communication on A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy COM/2011/21
2010	International Reference Life Cycle Data System (ILCD) guidance
2008	Sustainable Consumption and Production and Sustainable Industrial Policy (SCP/SIP) Action Plan COM/2008/397
2005	International Reference Life Cycle Data System (ILCD) – JRC and DG ENV (2005-2012)
2003	Communication on Integrated Product Policy – Building on Environmental Lyfe Cycle Thinking COM/2003/302

A systemic perspective is needed to support decisions that have impacts on the sustainability of policies, production systems and services — the environmental, social and economic spheres in which the concept of sustainability is articulated.

The first life cycle-oriented approaches developed in the 1960s and the 1970s were focused mainly on accounting for resource use and energy. The methodology has progressively evolved to analyse complex inventories of flows associated with product systems (resources, energy, materials, emissions and waste), and to assign to these physical flows their potential environmental impact indicators.

According to ISO 14040, LCA is a compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle. LCA is one of several environmental management techniques (such as risk assessment, environmental performance evaluation, environmental auditing and environmental impact assessment) and might not be the most appropriate technique to use in all situations. LCAs typically do not address the economic or social aspects of a product, but the life cycle approach and methodologies described in this International Standard can be applied to these

other aspects. LCAs, as they exist today, bring into play very specific features:

Life cycle focus: All stages of the life cycle of products and services are considered, from raw materials extraction, to processing and manufacturing, distribution, use, and end of life.

i. Multi-criteria analysis: Multiple environmental impact categories are included in the analysis.

ii. Quantitative methodology: Indicators are quantitative and based on mathematical models describing the cause-effect relationships deriving from different stressors (such as emissions and the use of natural resources).

iii. Comparative approach: The LCA is primarily designed to allow the choice of the best option(s) among two or more scenarios, given its quantitative nature.

iv. Global extension: The analysis can adapt to systems extended from the local to the global scale, capturing their peculiarities in relation to spatial variability.

The LCA methodology is standardised by ISO 14040 and ISO 14044 which describe principles, application, the phases of an LCA study, requirements, critical review and reporting. Other ISO standards of the 14040 series complement the general guidelines such as ISO 14046 for water footprint. Other environmental management standards are linked to ISO 14040-44 including ISO 14006 for eco-design, ISO 14025 for environmental labelling, ISO 14064 for carbon footprint of organisations, ISO 140671 for carbon footprint of products and ISO

14072 for organisational LCA.

Table 2: ***Workflow and Applications of the LCA***

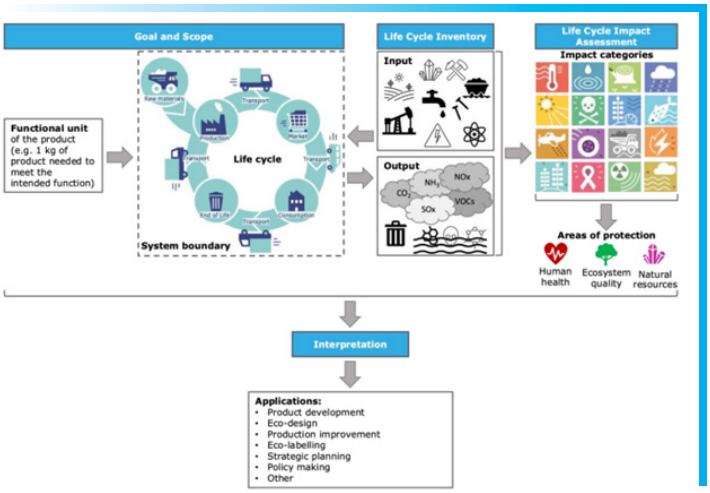


Table 3: ***Standardised Steps of an LCA according to ISO 14040-44***

1 – Goal and Scope Definition	2 – Life Cycle Inventory Analysis	3 – Life Cycle Impact Assessment
• Reasons and intended applications • Functional unit • System boundary • Impact categories • Allocations • Data requirements • Assumptions and limitations.	Collection of primary and secondary data on elementary and non-elementary flows exchanged through the ecosphere and the technosphere: • input of energy, raw materials, and other physical inputs • output of products, co-products, waste, emissions. Data calculation relating to unit processes, functional unit, and allocations.	Calculation of potential impact associated to the defined impact categories from inventory data. Optional grouping, normalisation, and weighting.
4 – Interpretation		
Interpretation of LCIA results, hotspot analysis to find relevant processes and flows, sensitivity analysis of modelling choices, recommendations. The interpretation may involve iteratively reviewing the choices made in the previous stages of the LCA.		

An important effort towards the harmonisation of the LCA has been made by the European Commission Joint Research Centre with the development of the European International Life Cycle Data System (ILCD). The aim of the ILCD was to provide in-depth guidelines for the application of LCA to the European context, both from a procedural and a scientific point of view, defining specific rules for the many options left open by the ISO in order to enhance the scientific robustness, consistency, reproducibility and comparability of LCA studies.

Based on this background, the European Commission adopted in 2013 the Recommendation on the Product and Organization Environmental Footprint capitalising on the methodological foundations of the ILCD, and advancing on scientific development to measure and communicate the life cycle environmental performance of products and organizations, in support to the European market and policymaking. There are several limitations to take into account with LCAs. The large amount of data needed to cover all material and energy flows related to the studied systems brings with it a certain degree of uncertainty, especially regarding the life cycle stages at the beginning and end of the supply chain. In addition, when performing LCA studies, it is often necessary to make assumptions about processes for which data are not available, or to use average data in terms of spatial and temporal resolution (such as national/annual), due to the size and complexity of globalised value chains.

The PEF and the OEF are designed to measure and communicate the life cycle environmental performance of products and organisations. Together, the PEF and OEF constitute the EF methods, grounded on the LCA standard methodology. A calculation based on the general PEF/OEF methods gives quantitative information on the impacts of the product or organisation, taking into consideration the entire value chain (from the extraction/growing of resources to the end-of-life stage). Following the framework standardised by ISO 14040-44, the EF is structured in similar steps, yet provides further specifications necessary to achieve a higher degree of robustness, consistency, reproducibility and comparability.

Table 4: ***Steps of the EF Method***

1. EF Goal and Scope Definition	2. EF Inventory Analysis	3. Impact Assessment
Functional unit shall be defined according to 'what', 'how much', 'how long' and 'how well'. In the system, boundary cut-off shall be avoided unless following specific rules. A default set of 16 impact categories shall be considered.	Detailed modelling requirements and data (e.g. electricity, transport, agricultural production). Data quality requirements (semiquantitative) are provided and shall be met by specific (primary) and generic (secondary) data. Allocation for recycling shall be applied using the circular footprint formula.	The mandatory steps are classification, characterisation, normalization, and weighting. Results shall be calculated as characterised, normalised and weighted for each impact category, and as a single score based on the weighting factors provided.
4. Interpretation and Reporting		
Interpretation shall include robustness assessment (completeness, sensitivity, consistency), hotspot analysis (most relevant impact categories, life cycle stages, processes, flows) and uncertainty (qualitative or quantitative such as **Monte Carlo simulation). Results shall be reported for the total life cycle and the total life cycle excluding the use stage.**		
5. Verification and Validation		
Minimum requirements on reviewers and review panels are defined depending on the intended application.		

A practitioner conducting an EF study performs all the steps illustrated in Table 4, starting from the definition of the system boundary under study, the functional unit (FU) — the reference unit defining qualitative and quantitative aspects of the function — and the reference flow, which is the amount of product or the output from the product system needed to provide the defined function.

The PEF method defines the functional unit as:

i. What: the function or service provided;

ii. How much: the extent of the function or service;

iii. How long: the duration or the lifetime; and

iv. How well: the expected level of quality.

In the case of OEF, the organisation is the reference unit for the analysis. In the most general sense, the overarching function of the organisation, for the purpose of calculating the OEF, is the provision of goods and services over a specified reporting interval. The product portfolio refers to the amount and nature of goods and services provided by the organisation over the reporting interval.

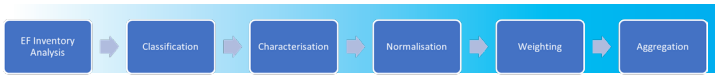
The mandatory life cycle stages included in an EF study are:

- Raw material acquisition and pre-processing: extraction of resources, pre-processing of all materials (including recycled materials), agriculture, forestry, packaging production, and transportation associated with these activities.
- Manufacturing: All processes taking place from the entry to the exit gate of the production facility (chemical processing, manufacturing, assembly).
- Distribution: transport and storage of the finished product(s), including the refrigeration and warehouse activities consumptions (energy).
- Use stage: product(s) use for the defined function and lifetime, including all necessary inputs (energy, maintenance materials).
- End of life: all activities occurring from the moment the product(s) ceases to perform its function and is disposed of or recycled. This includes collection and transport, dismantling, sorting, processing into recycled material, landfill, and incineration.

The PEF and OEF methods provide guidance for the collection and modelling of inventory data, including allocation rules for recycled materials and data quality requirements. All inventory flows are then translated into impact indicators for each mandatory impact category. Interpretation and reporting include mandatory assessments. Verification and validation of the EF studies by a verifier is mandatory whenever the EF study, or part of the information therein, is used for any type of external communication. Verification means the conformity assessment to check whether the EF study has been carried out in compliance with the PEF and OEF methods. Validation means the confirmation that the information and the data in the EF study and their communications are reliable, credible and correct.

Product Environmental Footprint Category Rules (PEFCRs) and Organization Environmental Footprint Sector Rules (OEFSRs) complement the general PEF and OEF methods by providing further specification at the level of a specific product category or sector. These rules help to place the focus of the PEF/OEF studies on those aspects and parameters that matter the most, and hence contribute to increased relevance, reproducibility and consistency of the results versus a study based on the general requirements of the EF methods. Moreover, PEFCRs and OEFSRs reduce the effort as well and the cost of performing an EF study.

Table 5: ***Steps of Impact Assessment Phase***



Classification implies assigning all input and output flows collected in the inventory to the relevant impact categories. Characterisation is the process to model environmental mechanisms linking the environmental pressures represented by inventory data. Normalisation is the calculation of the magnitude of the category indicator results relative to a reference system. Weighting is the process of converting normalised results of the different impact categories by using numerical factors based on the expressed relative importance of the impact categories considered.

Table 6: *Impact Categories in PEF/OEF*

Impact Category	Impact Category Indicator (Unit of Measure)	Description
Climate change, total	Radiative forcing as global warming potential – GWP100 (kg CO2 eq)	Increase in the average global temperature resulting from greenhouse gas emissions (GHG)
Ozone depletion	Ozone Depletion Potential – ODP (kg CFC-11 eq)	Depletion of the stratospheric ozone layer protecting us from hazardous ultraviolet radiation
Human toxicity, cancer	Comparative Toxic Unit for humans (CTUh)	Impact on human health caused by absorbing substances through the air, water, and soil. Direct effects of products on humans are not measured
Human toxicity, non-cancer		
Particulate matter	Impact on human health (disease incidence)	Impact on human health caused by particulate matter emissions and its precursors (e.g., sulphur and nitrogen oxides)
Ionizing radiation, human health	Human exposure efficiency relative to U-235 (kBq U-235 eq)	Impact of exposure to ionising radiations on human health
Photochemical ozone formation, human health	Tropospheric ozone concentration increase (kg NMVOC eq)	Potential of harmful tropospheric ozone formation ('summer smog') from air emissions
Acidification	Accumulated Exceedance – AE (mol H+ eq)	Acidification from air, water, and soil emissions (primarily sulphur compounds) mainly due to combustion processes in electricity generation, heating and transport
Eutrophication, terrestrial	Accumulated Exceedance – AE (mol N eq)	
Eutrophication, freshwater	Fraction of nutrients reaching freshwater end compartment (kg P eq)	Eutrophication and potential impact on ecosystems caused by nitrogen and phosphorous emissions mainly due to fertilisers, combustion and sewage systems
Eutrophication, marine	Fraction of nutrients reaching marine end compartment (kg N eq)	Impact of toxic substances on freshwater ecosystems
Ecotoxicity, freshwater	Comparative Toxic Unit for ecosystems (CTUe)	
Land use	Soil quality index, representing the aggregated impact of land use on: Biotic production; Erosion resistance; Mechanical filtration; Groundwater replenishment (Dimensionless – pt)	Transformation and use of land for agriculture, roads, housing, mining or other purposes. The impact can include loss of species, organic matter, soil, filtration capacity and permeability
Water use	Weighted user deprivation potential (m3 world eq)	Depletion of available water depending on local water scarcity and water needs for human activities and ecosystem integrity
Resource use, minerals and metals	Abiotic resource depletion – ADP ultimate reserves (kg Sb eq)	Depletion of non-renewable resources and deprivation for future generations
Resource use, fossils	Abiotic resource depletion, fossil fuels – ADP-fossil (MJ)	

The purpose of a life cycle impact assessment (LCIA) is to group and aggregate the information collected from the life cycle inventory of a product (or organisation) and to assess their respective contributions to each EF impact category. EF impact categories cover a broad range of relevant environmental issues following the general requirements of comprehensiveness of PEF and OEF studies. Table 6 illustrates the impact categories considered in PEF/OEF and the indicators used to assess them. Over time, the set of models has been updated to reflect the best available practices to address each impact category. The recommendations of the UNEP Life Cycle Initiative and those in the European EF are generally aligned, but some differences may exist. The updating has been based on the discussions and agreements achieved within the working groups of the Environmental Footprint and in the UNEP Life Cycle Initiative, although there are debates about adding categories into this list.

A shift to circular models provides a critical tool in delivering sustainability for the industry – but it will require changes at each stage in the value chain, involving players of all sizes and market segments. The use of hazardous substances in textile processing has to be eliminated, and resources have to be used much more effectively, with a shift away from fossil fuels towards renewable sources of energy and materials. The lifespan of clothing and other textile products has to be increased substantially, along with radically improving recycling when materials reach their end-of-life. Sustainable and circular textiles thus require entirely new ways of doing business, but will deliver an industry that benefits business, society and the environment. These methods, which will improve over time, provide the opportunity to gauge the production process for continuous improvement to achieve the sustainable development goals as set forth by the United Nations.

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Statement of the 80th Plenary Meeting

Driving Sustainability Through Innovation and Leadership

ICAC Secretariat
www.icac.org

1. The International Cotton Advisory Committee met virtually between 29 November – 1 December 2022 for its 80th Plenary Meeting since the establishment of the Committee in 1939. The meeting was the second to be held virtually and 384 persons registered including representatives from 20 Member Governments, 6 international organisations and 14 non-member countries.

Reports from ICAC Secretariat with focus on sustainability

2. **Market Outlook:** For the 2022/23 cotton season, international cotton prices are expected to remain below those of the previous season. Due to the uncertainty surrounding global macroeconomic conditions, price volatility is expected to remain high for the remainder of the 22/23 season. Production for 22/23 is currently recorded at 25.03 million tonnes. This level of production is despite a catastrophic crop in Pakistan and the United States. Consumption is lower than the previous season and is currently projected at 24.91 million tonnes. Production is currently outpacing consumption and there appears to be sufficient supply for estimated demand.

3. **World Cotton Trade:** For 2022/23, while it is projected that USA will remain the leading exporter, its exports will drop by 32% to reach 2.2 million tonnes and it may lose up to 10% of its world market share. Some countries are registering a fall in exports because of an expected fall in production due to bad weather. World imports will be led by China; however, it is projected to experience a 2.59% fall this season, due to the economic environment and the US sanctions that came into effect in June 2022. Because the cotton crop was severely damaged by heavy rainfall, Pakistan may increase its imports this season. Other variables including the expectation of a production shortfall in the 2022/23 season, supply chain issues, the on-going pandemic, lower consumption levels, and major policy changes may also impact cotton trade.

4. **Textiles Strategy:** Textiles are now a major area of emphasis at the International Cotton Advisory Committee. To provide value to ICAC members, the organisation will aim to integrate various segments of the cotton supply chain by developing a textiles data portal. The portal will provide information regarding member countries' textile industries and a business-to-business portal to connect member countries' textile companies. This initiative includes information beyond the production and consumption of cotton lint. The strategy also aligns with participating industries including machinery, dyes and chemical manufacturing, and the services sector. A textiles research network for academia and the textiles sector including allied industries is also planned.

5. **Production and Trade Subsidies Affecting the Cotton Industry:** Assistance to the cotton sector in 2021/22 has been estimated at $3.5 billion, a 57% decrease from the $8.3 billion observed in 2020/21. In 2021/22, assistance averaged 9 cents per pound, down from 22.5 cents per pound in 2020/21. The government assistance report included information from nine countries.

6. **ICAC Researcher of the Year:** The 2022 ICAC Researcher of the Year was Dr Jodi Scheffler, a cotton genetics researcher at the USDA Crop Genetics Research Unit and Adjunct Professor at Mississippi State University, USA.

What Climate Smart, Sustainability Policies/Initiatives Have you Put in Place for Cotton and Textiles, for Example to Respond to COP26?

7. COP26 was a major event, held in Glasgow in November 2021, that brought together leaders from all countries in the world to discuss, review and agree on how to step up global action to solve the climate crisis. ICAC member governments are responding to its findings in different ways, including investing in projects that build farmer resilience; improving global market transparency for inputs; re-evaluating varieties and production practices; initiatives to tackle greenhouse gas emissions, soil and water loss and energy usage; investing in enhanced extension systems; and implementing a variety of emissions-reduction programmes.

How Can Regenerative Agriculture Contribute to a Sustainable Cotton Industry?

8. Experts stated that policy measures need to upscale improved technologies for cotton production and must be pro-nature and pro-farmers. Restoration of soil health by restoring soil organic carbon content can improve soil structure and reduce the risks anaerobiosis at critical stages of cotton growth. In the context of climate change, the strategy should be to reconcile the need to produce more cotton with the necessity for improving the environment and restoring the health of degraded soils by re-carbonisation of the terrestrial biosphere via increasing stock of soil carbon in the root zone. However, farmers and land managers must be motivated to adopt conservation-effective cotton production systems through payments for ecosystem services.

9. In the tropics, crop rotation is important because it increases

the carbon stock in the soils. Cycling and nutrient use efficiency can improve crop productivity, especially in sandy soils. Increasing yields could be the best approach to increasing the sustainability of cotton over time because it requires improvement in soil quality, which is only possible with the adoption of conservation practices such as crop rotation. Identifying the most appropriate cover cropping systems is the main challenge for regenerative agriculture.

10. Regenerative agriculture has recently been identified by textile companies as an important consumer concern. When comparing a set of 13 statements about regenerative agriculture from textile companies, two common concerns emerge: climate and soil health. These are linked because soil health can sequester carbon and expand resiliency. Although there is no consensus on the principles, definitions or certifications of regenerative agriculture, its practice can be encouraged through support of cotton production protocols that include soil health. Textile consumer concerns about regenerative agriculture, climate change and microplastics offers an unprecedented opportunity for cotton to emphasise its role (both during the production and the processing phases) in protecting the environment. Microplastics offer an unprecedented opportunity for cotton to strengthen its role (both for production and processing) in protecting the environment.

Regulatory Policies by Governments that Could Negatively Affect the Consumption of Natural Fibres

11. All four Permanent Committees of the Private Sector Advisory Council (PSAC) urged the EU to revisit the process adopted by the EU commission and German government for policy making. In addition to their direct impact, once the EU has its policies in place, other countries are likely to follow and many of the PSAC members were not even aware of this legislation and its potential negative impacts. It was noted that the Product Environmental Footprint (PEF) system does not include a fair evaluation of the impact of microplastic pollution on the environment and relevant impact categories, such as use and end of life, were not accounted for in the presentation of the Higg MSI data. It was recommended that the complete life cycle of a product should be considered for asserting the environmental performance of a fibre. Products with renewable and biodegradable raw materials such as natural fibres are more circular than products made from fossil fuel sources because they can naturally decompose over time, and that needs to be included in all evaluations. Additionally, in a true cradle-to-gate analysis, the biogenic carbon captured in the fibre would be shown as negative emissions only, thus making cotton carbon negative.

12. Regarding traceability, it was recommended that any rules concerning cotton must also be applied to other fibres, including manmade fibres. Moreover, when considering cotton in particular, it is important to consider the social and economic impact of a sector that supports the livelihood of millions of farmers and textile workers across the globe. It is the only source of income for many households, making it a vital crop in raising the income of small-scale farmers and downstream stakeholders. Governments were urged to support the economies of less-developed nations which rely on cotton as one of their most-traded commodities.

Rethinking Fashion and Textiles for 2030

13. The textiles value chain spurs industrialisation and can also contribute to the achievement of the UN Sustainable Development Goals (SDGs). The first dedicated textiles session received an overwhelming response with seven speakers from different countries covering various topics. Next year, there will be more textiles sessions covering topics on textiles technology, dyes and chemicals, economics, sustainability, circularity, traceability, compliance and fashion.

World Café: The Evolving Global Textile Supply Chain

14. Cotton is the most complex agricultural commodity in terms of its supply chain. New technologies and processes that further contribute to this complexity, especially with regard to sustainability initiatives, will negatively impact Small and Medium Enterprises (SMEs) given their lack of extensive resources. If a technology such as traceability becomes too expensive or difficult to implement, SMEs will be the first to abandon them. Greenwashing is becoming an even bigger problem as companies try to portray their operations as being better and more environmentally friendly than they are. Another major issue is audit fatigue, which not only slows the supply chain down with additional requirements but will also affect SMEs more than their larger, better-funded competitors. One way to overcome this is to align and streamline the requirements from different organisations so stakeholders only need to go through one audit, as demonstrated by ABRAPA with Better Cotton.

Steering Committee

15. The Committee noted the proposal to form an International Textiles Research Council and suggested that the Secretariat revisit the proposal and utilise ICAC's strength as an intergovernmental body to connect with existing textile networks and activities and to take advantage of ICAC's infrastructure and activities in lieu of establishing a brand new, complex organisation.

The Topic of the 2023 Technical Seminar

16. The Committee decided to hold the 2023 Technical Seminar on a topic that was a combination of two proposed titles: 'Recent Technological Innovations as Gamechangers on Cotton Farms' and 'Climate Smart Technologies for Cotton Production'. The exact wording would be approved at a later date.

Future Plenary Meeting:

17. The Plenary Meeting for 2023 will be a face-to-face meeting.