

Singapore Fashion Council

Baseline Assessment Report

01 Sept 2026

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Introduction

How to navigate this report ?



*This baseline assessment report provides Singapore enterprises with an overview of the fashion and textile sustainability landscape across Singapore & selected ASEAN markets, drawing on both primary and secondary research. To get the most out of it, you can **navigate through the following sections**:*

Who & what is this deck useful for?

- **Understand target market readiness:** Assess the specific sustainability targets, recycling rates, and Extended Producer Responsibility (EPR) policy **developments in your target countries**
- **Anticipate supply chain roadblocks:** Prepare for **common regional challenges**, such as heavy reliance on fossil fuels, limited material traceability, and a lack of recycling technology
- **Navigate global compliance:** Use these insights to align your supply chain with **tightening international regulations**, such as the EU circularity strategies and CBAM
- **Identify business opportunities:** Leverage the eight key industry **enablers identified** in the report to **spot gaps** where you can introduce innovative technology, shared platforms, or cross-border partnerships

How to read this slide deck?

- **For the core framework (Section 1):** Review the global industry-standard metrics used to measure sustainability and circularity
- **For Regional benchmarking (Section 2):** Compare Singapore's market size, policy maturity, and sustainability readiness against Vietnam, Thailand, and Indonesia"
- **For On-the-Ground realities (Section 3):** Explore practical insights, actual capabilities, and pain points gathered from over 70 Singapore & ASEAN stakeholders
- **For Singapore's regional role (Section 4):** Discover recommendations for Singapore to act as a Catalyst, Enabler, Convenor, and System Designer
- **For detailed market intelligence (Annex 1):** Access the "Country Deep Dives" for granular data on national outlooks, policies, and local initiatives



Acknowledgements

This sectoral plan was developed by the Singapore Fashion Council (SFC) with funding support from Enterprise Singapore. SFC gratefully acknowledges Enterprise Singapore's support in advancing the sustainability readiness of the fashion and textile sector.

This sectoral plan, amongst other sources, draws on the Centre for Impact Investing and Practices' (CIIP) survey of MSMEs in Southeast Asia, done in conjunction with its study "Transforming for Sustainability: Driving Impact and Value through Supply Chain Action". CIIP prepared a special pull-out for SFC based on responses from over 400 textiles and apparel MSMEs across Indonesia, Malaysia, Singapore, and Vietnam. The data and insights were shared with SFC for the purposes of this project and remain the intellectual property of CIIP. CIIP is not responsible for the interpretations, findings, or recommendations in this report.



Executive Summary

Executive Summary

This baseline report, prepared by South Pole in collaboration with the Singapore Fashion Council (SFC), identifies sustainability gaps and opportunities across the Singapore & ASEAN fashion ecosystem and highlights how Singapore & Singapore enterprises can leverage its strengths to drive regional collaboration, innovation, and scalable solutions. The findings will inform a sectoral plan to be released in 2026.

Approach & methodology

This report draws on three complementary research streams, combining primary and secondary data to deliver a holistic assessment of Singapore's position within the Singapore & ASEAN fashion sector.

1. Identification of industry-aligned metrics: South Pole reviewed global standards, best-practice reporting trends, and current industry measurement practices to define a harmonised metrics framework for the baseline. These metrics informed a survey across Singapore & ASEAN fashion value-chain actors to benchmark sustainability policies, performance, and initiatives at the entity level, providing the evidence base for Singapore to strengthen its role as a regional catalyst for sustainable fashion.

2. Benchmarking Singapore & ASEAN fashion hubs: A comparative assessment benchmarked Singapore against Indonesia, Thailand, and Vietnam – selected for their market size, policy maturity, and institutional readiness. This benchmarking examined textile-waste systems, regulatory developments, recycling technologies, circularity initiatives, and the influence of global sustainability pressures on each market.

3. Engaging across the Singapore & ASEAN fashion value chain: Over 70+ stakeholders were engaged across brands, manufacturers, recyclers, NGOs, and SMEs, through 20+ interviews and receiving 50+ survey responses. These engagements provided practical insights into organisational capabilities, progress on sustainability and circularity, and opportunities for regional acceleration, including Singapore's role in driving collaboration.

Findings & insights

Fashion hub benchmarking

Vietnam, Thailand and Indonesia are advancing sustainability, but progress varies and key gaps remain. Vietnam's exporters face tightening regulations, yet SMEs lag behind; Thailand offers incentives and standards but is still building EPR frameworks; and Indonesia's circularity ambitions outpace its current infrastructure. These inconsistencies in capability and systems create a clear opening for Singapore to lead as the region's bridge and accelerator for the Singapore & ASEAN fashion ecosystem.

Executive Summary (cont.)

Baseline survey

Progress across markets remains uneven, shaped by differing levels of policy maturity, infrastructure and industry capability. Manufacturers show the strongest engagement with sustainability standards, with the highest proportion holding certifications such as Higg FEM, ISO 14001, ZDHC and Carbon Neutral. Yet measurement practices are far less consistent: only 43% of surveyed organisations (15 out of 35 who responded to this question) regularly track their greenhouse gas emissions, textile waste and water use, and wastewater monitoring remains limited. Data on textile waste is particularly sparse, especially among SMEs, many of which still rely on informal or manual methods such as upcycling, donations or ad-hoc record-keeping.

Insights and opportunities from stakeholder interviews

- Shared frameworks and platforms are required to align standards and streamline requirements across the fashion value chain.
- Harmonised regulations and financial incentives to reduce fragmentation and accelerate cross-border sustainability.
- Digital systems for consistent reporting and traceability, easing burdens for suppliers of all sizes.
- Collaborative pilots and partnerships to scale recycling, waste management, and low-carbon production technologies.
- Joint initiatives to raise consumer awareness, build trust, and drive demand for sustainable fashion from consumers.

Positioning recommendation

This research confirms that **Singapore is positioned to lead as the catalyst and collaborator for the Singapore & ASEAN fashion industry, connecting research, policy, and industry to co-develop scalable solutions for a circular and low-carbon fashion future.**

Section 1

Identification of industry- standard metrics

Identifying industry-standard metrics for measuring sustainability and circularity

Identifying metrics is an essential first step in measuring sustainability and circularity within the fashion industry. This process involved:

- Reviewing global standards and best practices for key sustainability and circularity indicators.
- Benchmarking a sample of leading companies to identify the data metrics they use to report sustainability progress.

This exercise established a foundation for evaluating performance and defining key indicators to measure sustainability and circularity within the fashion industry.

The outcomes of this process guided the design of stakeholder engagement interviews and survey conducted in this study.

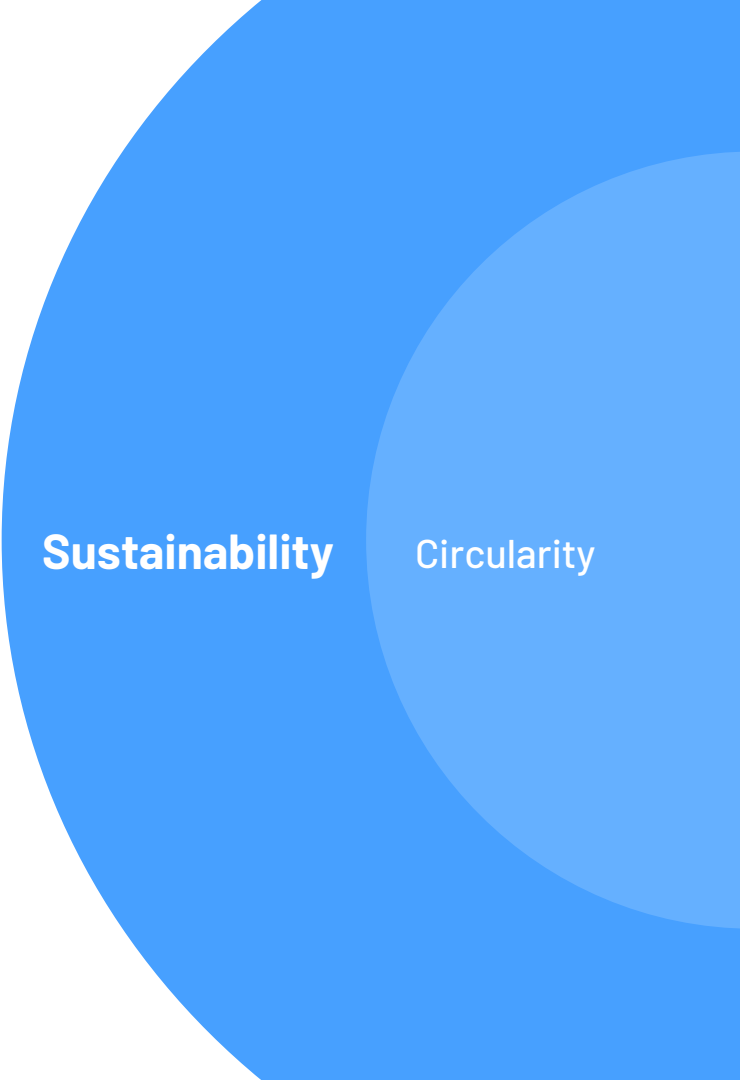


Sustainability vs. circularity in fashion: what's the difference?

Sustainability can be understood as a holistic vision built on three core pillars—environmental, social, and economic. It encompasses efforts such as minimising carbon footprints across product life cycles, using resources more efficiently, ensuring fair labour practices, and reducing waste. This study focuses on environmental aspects only.

Circularity is a subset of sustainability that focuses on reusing materials to create new textiles and garments, thereby eliminating waste and pollution. It is guided by three key principles: eliminating waste and pollution, circulating products and materials at their highest value, and regenerating nature. As a systemic framework, circularity directly addresses pressing environmental challenges such as climate change, pollution, waste, and biodiversity loss.

For example, sustainability ensures a garment is responsibly manufactured across its lifecycle (environmental, social, economic aspects), while circularity ensures that once the garment is no longer used, it re-enters the system as raw material, eliminating waste.



A Venn diagram consisting of two overlapping circles. The larger circle on the left is a medium blue and contains the word 'Sustainability' in white. The smaller circle on the right is a lighter blue and contains the word 'Circularity' in white. The two circles overlap, with the intersection area being a darker shade of blue.

Sustainability

Circularity



Measuring sustainability performance in the fashion industry

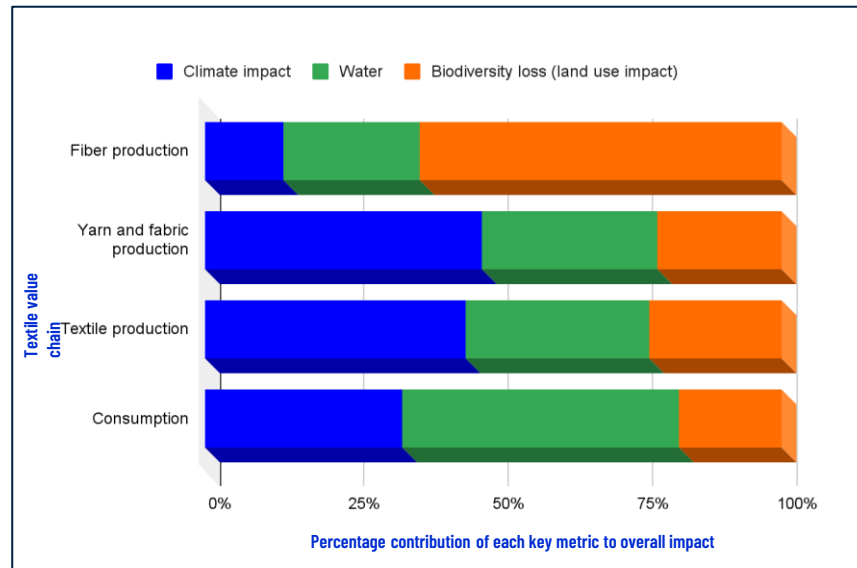
There is no universally accepted standard for measuring circularity and sustainability in the fashion industry. However, best-practice guidelines exist, most of which refer to common metrics such as GHG emissions, water and wastewater, and waste as key indicators of sustainable fashion performance.

	Key measurement metrics	Relevant standards and global industry bodies
Climate change	● GHG emissions ○ Fossil fuel ○ Renewable energy ○ Raw material use ● Water use ● Share of products containing recycled materials	● UN Fashion Charter for Climate Action ● The Fashion Pact ● Global Fashion Agenda (GFA) ● Fashion for Good ● Sustainable Apparel Coalition / Cascal ● Textile Exchange ● Asia Clean Energy coalition ● Apparel Impact Institute ● Watch & Jewellery Initiative 2030 ● EU circularity metrics for textiles ● IFRS sustainability for apparel, accessories, and footwear
Waste & pollution	● Quantity of materials used ● Textile reuse ● Textile waste ● Packaging waste ● Volume of waste treated through safe waste management methods ● Microplastics generated from synthetic textile	
Biodiversity	● Deforestation ● Land use and land use change ● Agricultural practices for production of raw materials	



A global study showed the complexity of environmental impact along the fashion value chain

- Emission-intensive activities are most prominent in the **textile production stage**.
- Water use is highest during the **consumption stage**, particularly from cleaning and washing.
- Land use impacts are most evident in **fibre production**, where agricultural landscapes are converted for raw material cultivation.
- Other stages of the value chain contribute indirectly to land use through the **land associated with producing the energy** required for manufacturing and laundering textiles.



Sources: UN Environment Programme. (2020). *Sustainability and circularity in the textile value chain: Global stocktaking* (Philippa Notten, Ed.). Nairobi, Kenya. <https://wedocs.unep.org/bitstream/handle/20.500.11822/34184/SCT.pdf?sequence=3&isAllowed=y>

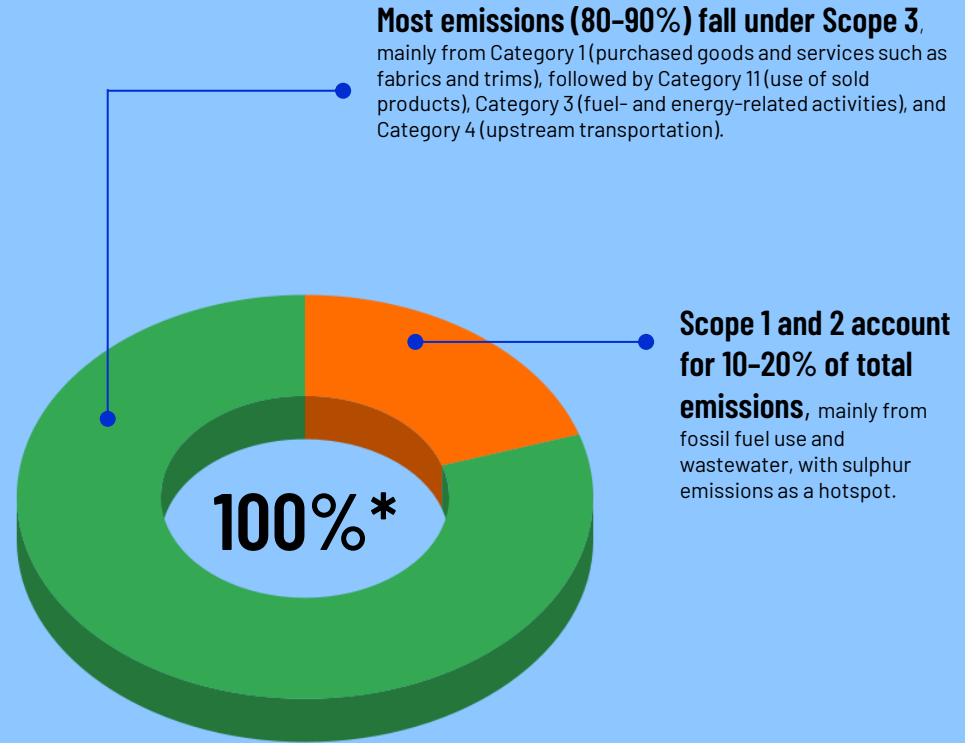


Benchmarking climate impact: Scope 3 consistently emerges as the main hotspot

South Pole assessed five leading companies across the textile value chain—Sappi Group, Lenzing Group, Inditex, Adidas and TAL Apparel—to understand how they measure and report climate impact.

Across all five, GHG emissions are the primary lens of assessment. Most companies report emissions across Scope 1, 2 and 3, with Scope 3 overwhelmingly representing the largest share of emissions.

Within Scope 3, the biggest contributors are purchased goods and services (especially fabrics and trims), followed by the use of sold products, fuel- and energy-related activities, and upstream transportation.



*Proportion of emissions across benchmarked companies, expressed as a percentage of total company emissions.

Key indicators for measuring sustainability and circularity: insights from global standards and industry benchmarking

The findings from the global standards review and industry benchmarking informed the selection of indicators used in this baseline assessment study, in particular the stakeholder survey. The chosen indicators reflect those commonly utilized in global standards and reported by leading companies:

Sustainability indicators	Circularity indicators
Climate impact: ● GHG emission ○ Fossil fuel ○ Renewable energy ○ Raw material use ● Water use ● Wastewater management Responsible sourcing ● Raw material sourcing	● Textile reuse ● Textile waste generation and management (e.g., recycled, landfilled, etc) ● Percentage of recycled content in products

Section 2

Regional Benchmarking — What It Means for Singapore Enterprises

Singapore Enterprise Lens: Country Review

The fashion sector in Southeast Asia is experiencing rapid growth, fuelled by expanding middle-class populations and a largely digital-native youth. Singapore is positioned to lead this growth as the region's innovation and trade gateway. Together, six major markets — Singapore, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam — are expected to surpass USD 50 billion in value.

To strengthen Singapore enterprises' regional expansion efforts, this section provides a high-level overview of three key fashion hubs — Indonesia, Thailand, and Vietnam. It examines each market's consumer landscape, manufacturing ecosystem, sustainability developments, and business environment to help such enterprises identify growth opportunities, navigate market entry considerations, and explore potential regional partnerships.

The selected countries were chosen based on their market size, manufacturing capacity, role as export hubs, and sustainability maturity within the textile sector, including relevant regulations, policies, and the strength of national industry bodies and sustainability-focused fashion associations. Country-specific deep dives and additional market insights are available in Annex 1.

Sustainable fashion: A country readiness evaluation (1/2)

This assessment evaluated the potential of Vietnam, Thailand, and Indonesia as sustainable fashion hubs in comparison to Singapore. Insights from this evaluation informed opportunities for Singapore to advance sustainability and circularity within the regional fashion industry.

South Pole reviewed current market trends and size, import/export activities, management of textile waste, and existing policies related to sustainable textile industries, including Extended Producer Responsibility (EPR). It also considered current sectoral targets and industry initiatives responding to global sustainability pressures.

No.	Evaluation category	Singapore	Thailand	Vietnam	Indonesia
1.	Fashion industry export value (USD)	~2.15 billion annually	5.55 billion in 2023	>40 billion in 2023	~13 billion annually
2.	Reliance on material imports for export production (%)	50%	32.3%	64%	49%
3.	Textile waste:				
	• Post-industrial (t)	N/A	N/A	935,000	N/A
	• Post-consumer (t)	211,000	270,000	1,305,000	462,000
4.	Textile recycling rate (%)	2%	N/A	N/A	~13%
5.	EPR for textile	Under development	Under development	EPR in place - textile excluded	EPR in place - textile excluded



Sustainable fashion: A country readiness evaluation (2/2)

No.	Evaluation category	Singapore	Thailand	Vietnam	Indonesia
6.	Other sustainability reporting	Mandatory Packaging Reporting (MPR)	- Voluntary product sustainability certification - Thai Industrial Standards (TIS) for synthetic dye products	- Green transition: GHG emission reporting - Technical regulation on industrial wastewater	Green Machine Standard
7.	Country sustainability target for the fashion industry	Net-zero emissions by 2050, with carbon tax and 15% renewables by 2030	Thailand aims to be a regional textile hub and make fashion a key driver of foreign investment.	10% of electricity from renewables by 2025 - Energy use cut 0.4–0.7% per year - Textile/footwear: 15% energy and 20% water reduction by 2025 - Resource efficiency: 5–8% less material use by 2025, 7% by 2030 ≥20% fibres from recycled polyester; ≥15% from organic cotton - More eco-labelled products (BCI, Oeko-Tex, LEED, Higg, ZDHC, ISO 14001) - By 2030: leading hub for sustainable textile and apparel production	- Emissions reduction target: 31.89%, including textiles, via renewables and better energy use 2025–2049: build a sustainable ecosystem for the textile industry
8.	International market impacts	EU's Digital Product Passport	EU Strategy for Sustainable and Circular Textiles (SSCT), CBAM, CSRD, and CSDDD	CBAM, EU Strategy for Sustainable and Circular Textiles (SSCT), CSRD, CSDDD, US Uyghur Forced Labor Prevention Act	New US tariffs, CBAM, EU Strategy for Sustainable and Circular Textiles (SSCT), CSRD, CSDDD

Common challenges fashion hubs outside of Singapore

Indonesia, Thailand, and Vietnam were assessed based on their performance regarding sustainability and circularity metrics, as defined in the section [Identification of Industry-Standard Metrics](#). The information was gathered from secondary research and a literature review. The results indicate that these three countries face certain common challenges, outlined below. A more detailed assessment of each country is provided in [Annex 1](#).

Limited traceability in material sourcing

There is currently limited adoption of digital technologies to help companies trace the materials they procure, particularly from foreign suppliers.

High dependence on fossil fuels

Many facilities rely heavily on fossil fuels, and insufficient grid integration, energy storage, and distribution infrastructure make large-scale renewable adoption challenging.

Lack of sorting & limited recycling technology

Most textile waste is treated as mixed waste due to limited technology for handling multi-fiber materials. As a result, textile waste has become a major source of microplastic pollution.

Industry dominated by SMEs

In these countries, 70–90% of textile companies are SMEs, which limits their operational and financial capacity to adopt sustainable and circular practices.

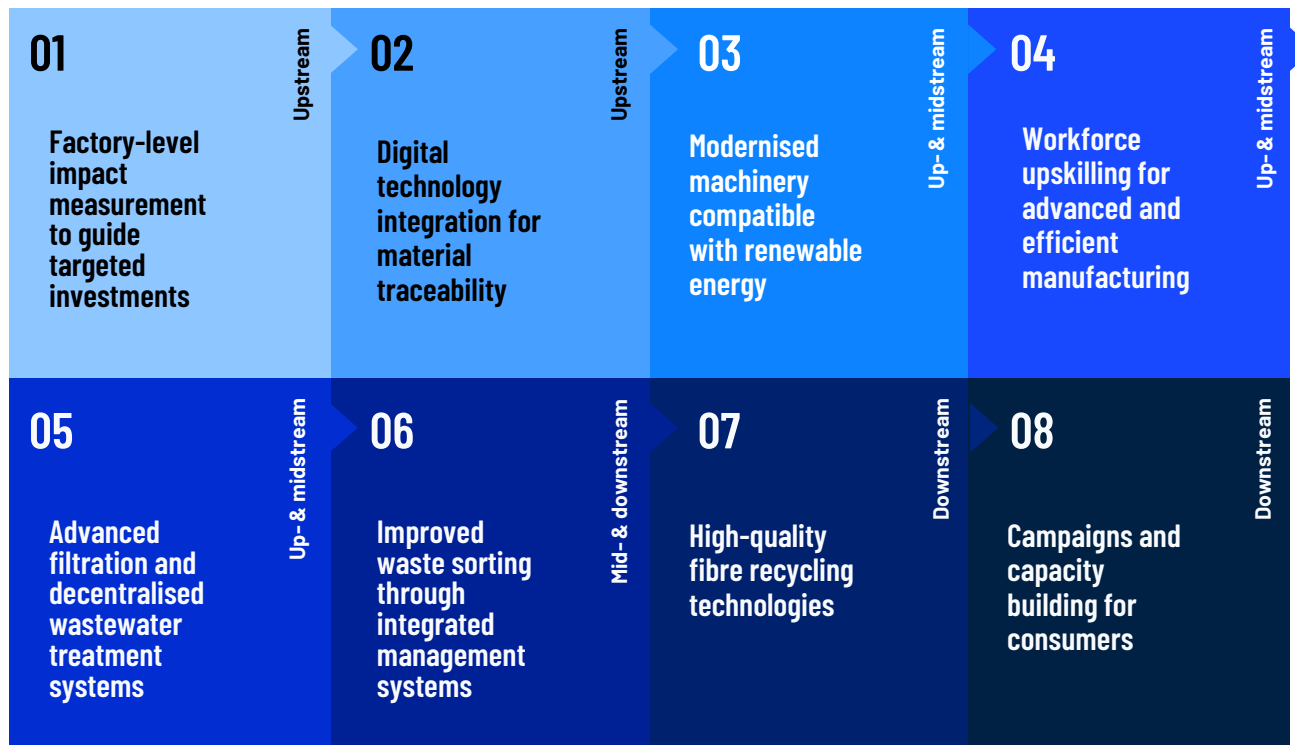
Limited data on water & wastewater impact

Although the environmental impact is clear, there is currently insufficient baseline data on water consumption and wastewater treatment to fully assess the magnitude of the impact.

Common enablers for scaling sustainability in the region

The study identified **eight priority enablers** that will strengthen the sustainability and circularity of the Singapore & ASEAN fashion sector.

If government support is provided in **policies, infrastructure, and SME development**, these enablers also present opportunities for Singapore enterprises to partner with regional stakeholders and deliver solutions that support industry transformation.



Key takeaways for fashion hubs in the ASEAN region

Progress on sustainability and circularity is uneven, reflecting differing market pressures and capabilities.

Vietnam

- Export powerhouse
- Under increasing pressure to meet international standards
- Green transition law and wastewater standards are becoming increasingly stringent

Thailand

- Advancing sustainable textiles through national recycling targets
- Active policy incentives and environmental standards
- Second hand luxury market is booming

Indonesia

- Developing a national circular economy roadmap to support sustainable fashion
- Standards and tax incentives to promote sustainable manufacturing
- Emerging recycling hub in Java from market demand

What This Means for Singapore Enterprises

These findings help Singapore companies prioritise markets, identify partnership opportunities and prepare for evolving sustainability requirements

- **Leverage Singapore's position as a regional hub** to drive sustainable fashion innovation through trade, R&D, and textile technology that will strengthen the sustainability and circularity of the Singapore & ASEAN fashion sector.
- **Capitalize on Singapore's strong sustainability ecosystem** to strengthen business competitiveness and prepare for evolving global market expectations.
- **Respond to growing consumer demand** by developing sustainable products, improving transparency, and adopting circular business models.

Section 3

Engagement with Singapore & ASEAN industry stakeholders

3.1 Summary of survey results

About the survey

The survey aimed to collect environmental data from manufacturers, brand owners, and recyclers. The data focused on key sustainability and circularity metrics based on global standards, best practices, and industry trends.

The survey questions specifically collected data on sustainability reporting, GHG emissions, textile waste, water and wastewater management, recycling initiatives, and other related sustainability efforts.

While the results of this survey highlight common concerns, opportunities and challenges across the region, they do not provide a quantitative baseline of GHG emissions or other metrics, as the majority of companies surveyed were unable to provide quantitative data. With a total of 54 respondents with varying characteristics such as business size, product types, value chain structures, and production processes, the survey results present a snapshot of a cross-section of the industry and are not intended to represent industry averages.

However, the findings provide an important evidence base for Singapore to identify shared regional priorities and shape collaborative actions that strengthen local enterprises and the broader Singapore & ASEAN sustainable fashion ecosystem.

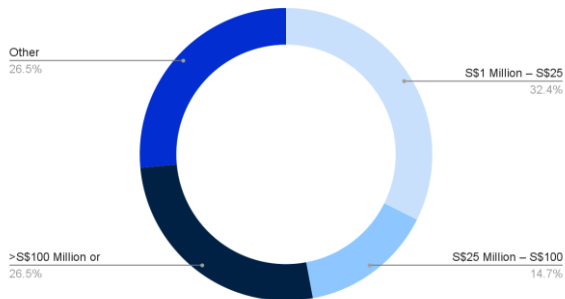
Profile of survey respondents

The survey received 54 responses. Most participants were Singapore Fashion Council members/affiliates, supplemented by respondents from South Pole's business network.

Breakdown of survey respondents:

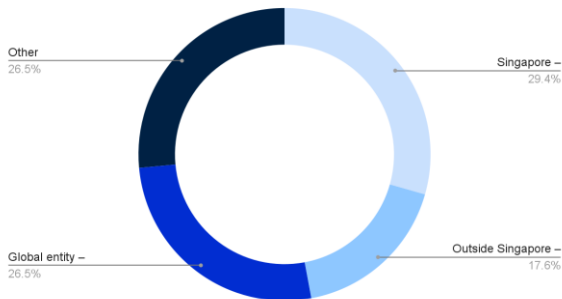


Revenue (%)



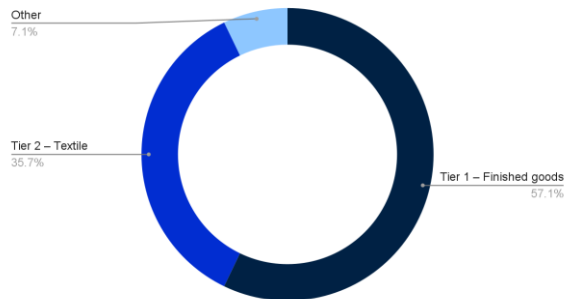
Nearly half of respondents are small to medium-sized enterprises ($\leq$ \$100M), reflecting the profile we aimed to engage for this work.

Location of primary business operations



Overall, primary operations of respondents were mainly outside of Singapore. No manufacturers reported SG as their primary location, while two-thirds of brands/retailers did.

Type of manufacturer (%)



Manufacturers were mainly in textile production or finished goods (none were further upstream). One manufacturer categorized themselves as a 'trading agent'.

Sustainability reporting

Certifications and standards adhered to by manufacturers, brands and retailers

60%*

of Manufacturers
responded to this
question

35%*

of Brands & Retailers
responded to this
question

*out of total respondents

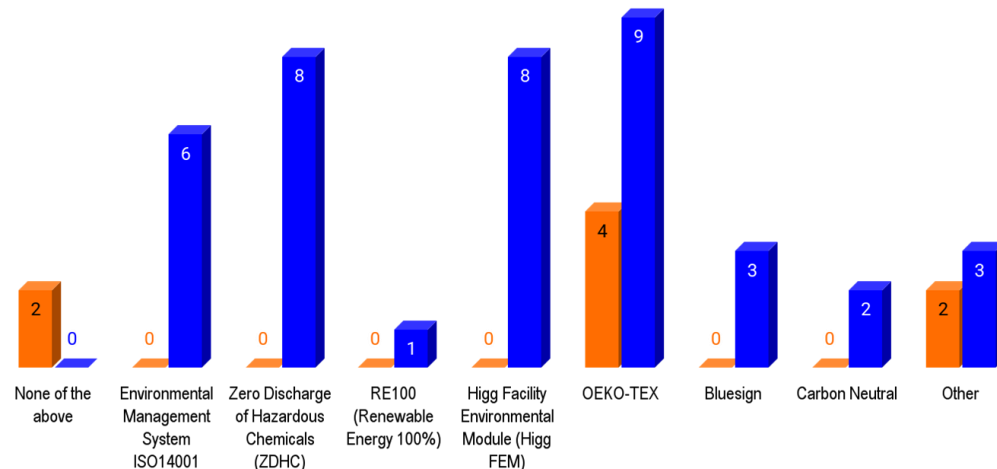
Among the surveyed manufacturers, a majority utilize various internal reporting standards or report directly to their customers. **Key certifications reported by manufacturers include Carbon Neutral, Higg FEM, ISO 14001, and ZDHC.** Both ZDHC and OEKO-TEX certifications ensure that the chemicals used during production are safe for both humans and the environment. Notably, a single manufacturer can pursue multiple certifications.

In contrast, **brands and retailers typically report to OEKO-TEX.**

In summary, both manufacturers and brands/retailers recognize the importance of these certifications in measuring their sustainability and circularity efforts, with **customer demand being the primary driver for reporting.**

Reporting trend

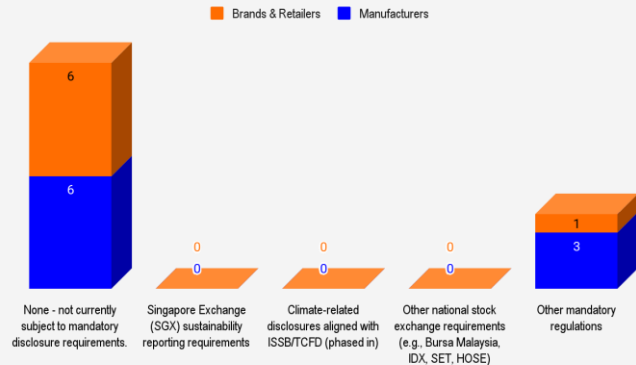
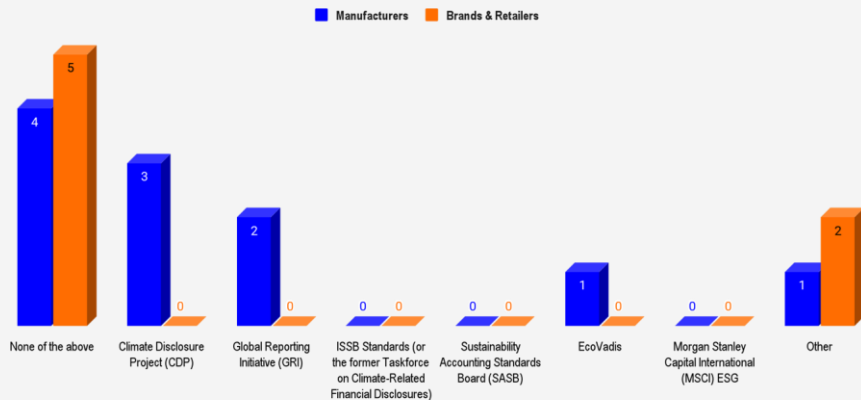
Brands & Retailers Manufacturers



Third party platforms and mandatory reporting

Some companies, including manufacturers and brands/retailers, align their disclosures with third-party standards and organizations like CDP and GRI.

However, the majority of brand owners do not share their reports on external platforms.



The majority of manufacturers and brands/retailers report that they are not currently subject to mandatory disclosure requirements such as SGX, ISSB/TCFD, and other national stock exchanges (12 out of 35 manufacturers and brands selected this option), four manufacturers and brands reported compliance with other mandatory regulations, including the BEPI framework on Sustainability Platform, ASX, and membership in Singapore's raiSE for Brands and Retailers.

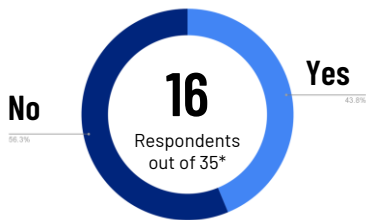


Key data points tracked by respondents

Which data points are monitored by the industry?

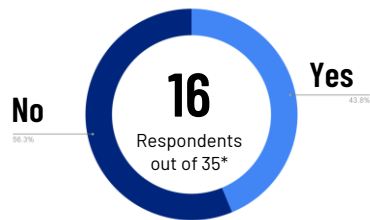
GHG Emission

Seven out of 15 manufacturers track their GHG emissions, while none of the surveyed brands and retailers currently do, though they report plans to start within the next two years.



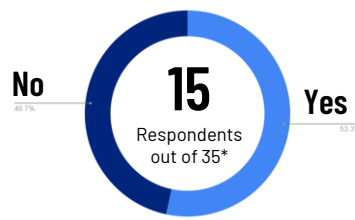
Textile waste

Five manufacturers and two brands/retailers report measuring textile waste, while four manufacturers and five brands/retailers do not measure it but plan to.



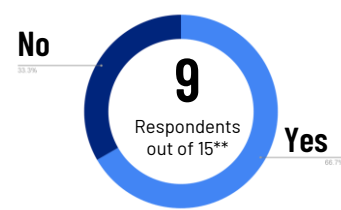
Water use

Eight manufacturers measure water use, while one manufacturer and all six brands/retailers do not. Additionally, almost all brands (5 out of 6) indicated they have no plans to measure it in the future.



Wastewater discharge

The reporting of wastewater discharge is applicable only to manufacturers. **Six manufacturers actively report wastewater discharge**, while three do not.

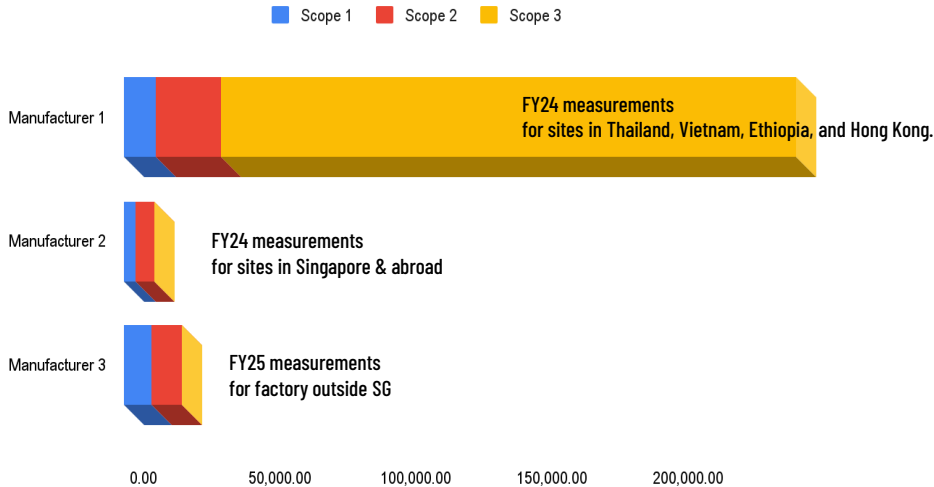


*35 is the total of both Manufacturers and Brands respondents

**Only for manufacturer respondents

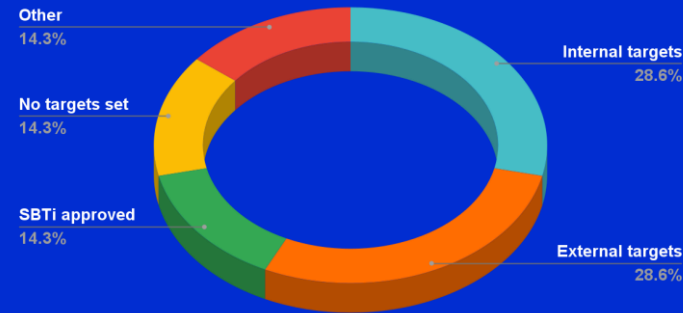
GHG emissions accounting and target setting for manufacturers

While none of the surveyed brands track their GHG emissions, 7 out of 15 manufacturers indicate that they engage in GHG emission tracking. Among these, **only 3 out of 7 provided data** on their emission profiles for the fiscal years 2024 and 2025. All three report that their GHG accounting is aligned with the GHG Protocol. Only 1 manufacturer measures their scope 3 emissions.



Only 1 out of 7 manufacturers responding to this question has SBTi-approved targets.

While the majority have set internal or external targets, these are not SBTi-approved.



Value chain collaboration initiatives by manufacturers

5 out of 9 manufacturers that responded to this question reported collaborating with their suppliers on various decarbonization initiatives.

Value chain collaborations cited by manufacturers:

Data collection

Collecting data from suppliers and encouraging the development of GHG reduction plans through high-level meetings.

Standards compliance

Collaborating with suppliers to support sustainability initiatives, including:

- Compliance with ZDHC for chemical management.
- Participation in BEPI risk assessments as requested by brand partners.

Supplier engagement & monitoring

Continuously monitoring the environmental performance of suppliers and implementing a supplier engagement program to aid their decarbonization efforts.

Planning & tracking

Focusing on wet processing mills, which have the largest impact in the value chain, by:

- Requiring mills to track their emissions.
- Requesting action plans for carbon and water reduction.

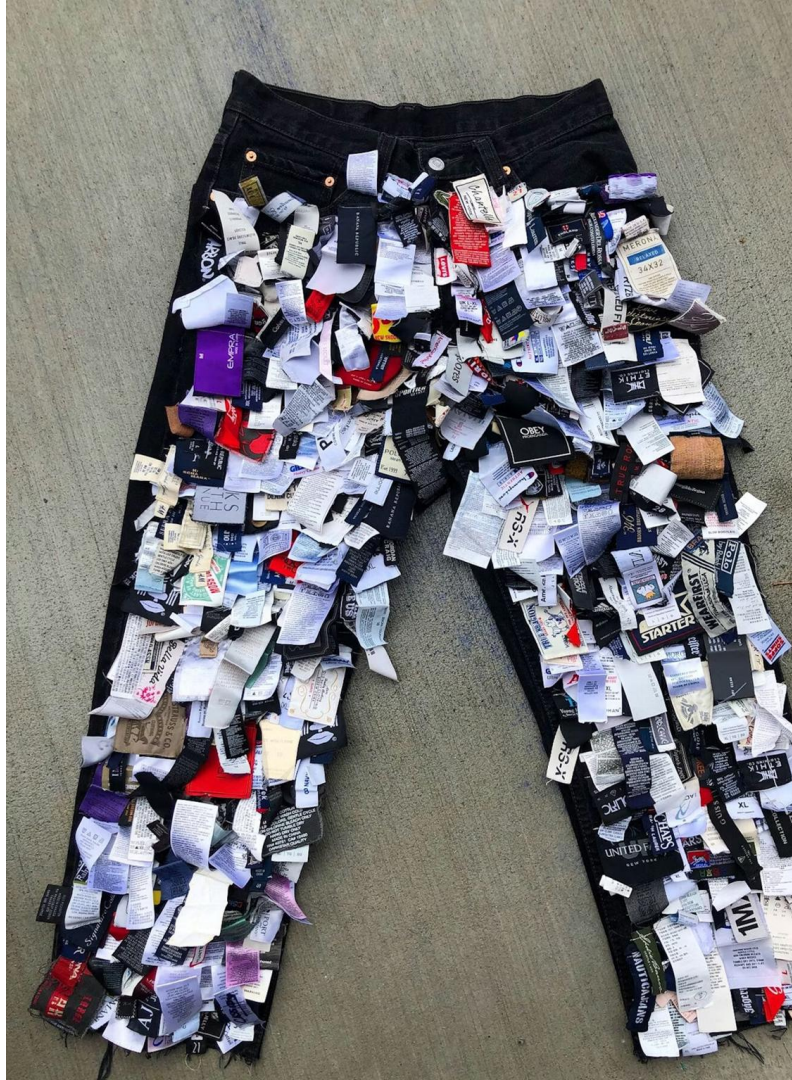
Capacity building

Rolling out decarbonization capability-building programs to enhance suppliers' ability to track emissions and develop emission reduction roadmaps.

Most surveyed brands and retailers did not provide waste generation figures

The following are some of the data collection challenges reported by respondents:

- **Formal measurements are not conducted** at this stage due to small-scale operations, but textile waste is minimized through efficient pattern cutting and mindful production practices.
- **Off-cuts are sent** to a company that transforms them into crafts, such as rugs and pouches.
- **Various initiatives are in place to manage old inventories** through sales and donation drives; however, **these are not measured** at this time.
- Implementation is challenging as **staff do not consistently follow the standard operating procedures (SOP) for fabric waste**. In-house capacity to measure of textile waste is generally limited.
- **Waste is manually tracked**; since the beginning, the use of pre-consumer textile waste has involved keeping remnants for accessories, but small scraps are not tracked.
- Textile waste is a primary material, but **tracking of small scraps is not currently performed**.

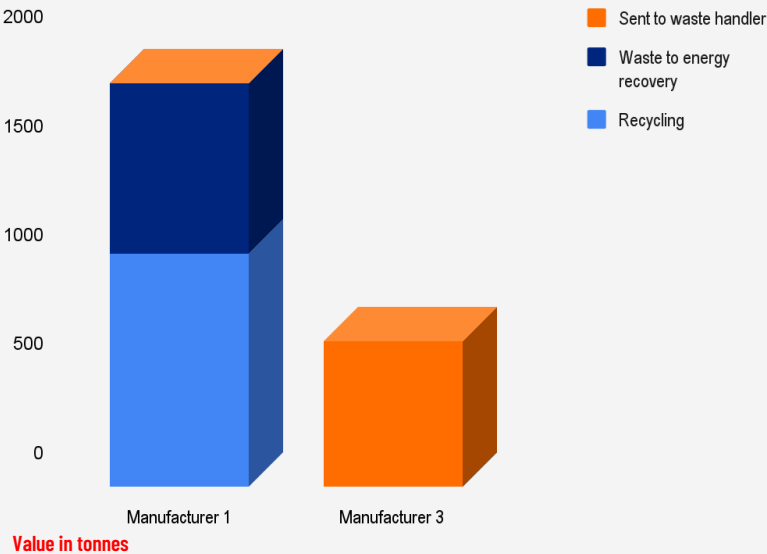


Waste management methods

Out of a total of 15 manufacturer respondents, **9 addressed the waste question, with 5 reporting that they measure their waste generation at the factory level.** They primarily assess waste using material input versus output, factory utilization data, and the amount of scrap collected on the factory floor, including cutting efficiency. **Four manufacturers provided specific figures for waste generation.** The variation in waste generation results depends on the scope and size of the measurement; for instance, some data only includes one factory located in Thailand.



End-of-Life (EoL) Management of Textile Waste



Waste reduction measures

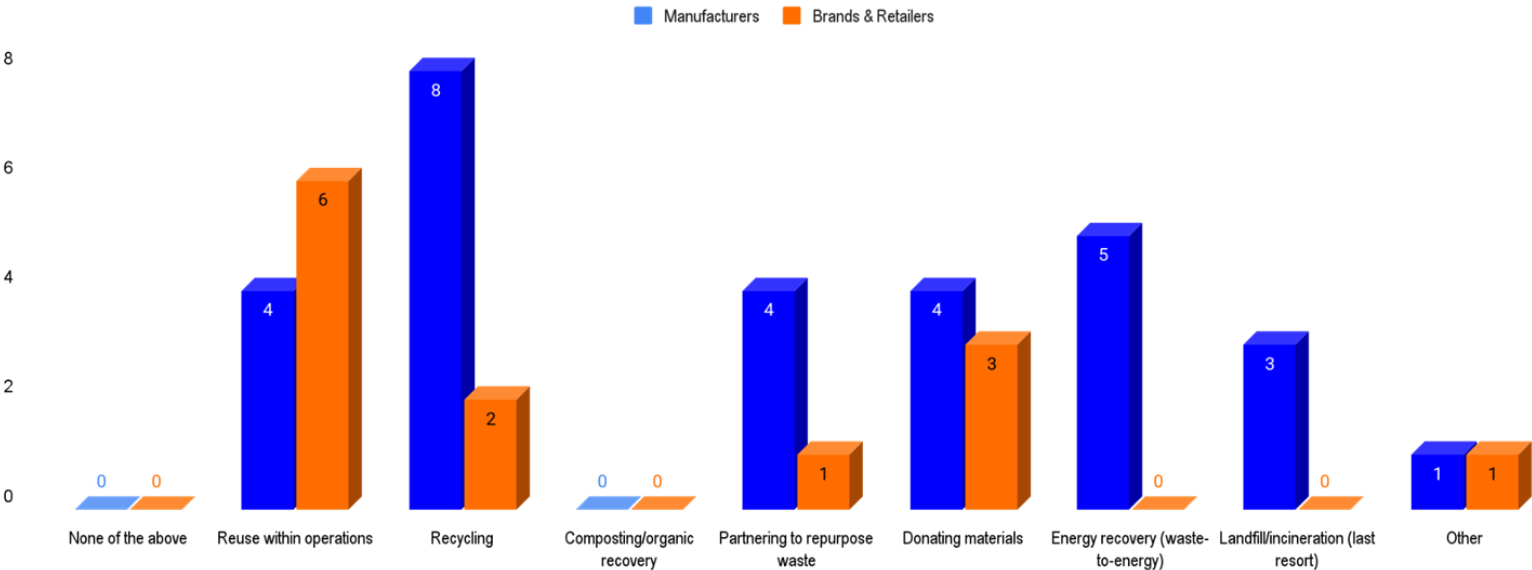
9

respondents from manufacturers

6

respondents from brands/retailers

The efforts of both manufacturers and brands/retailers in reducing waste primarily focuses on reusing materials within operations and redistributing items to partners for repurposing or donation. Regarding end-of-life treatment, manufacturers mainly recycle materials and send waste for energy recovery.



Waste recycling methods

A total of 19 recyclers responded to the survey designed specifically for recyclers. The survey aimed to assess the current state of textile waste management and the efforts or technologies employed by the downstream sector in managing textile waste.

Most recyclers report their activities focus on:

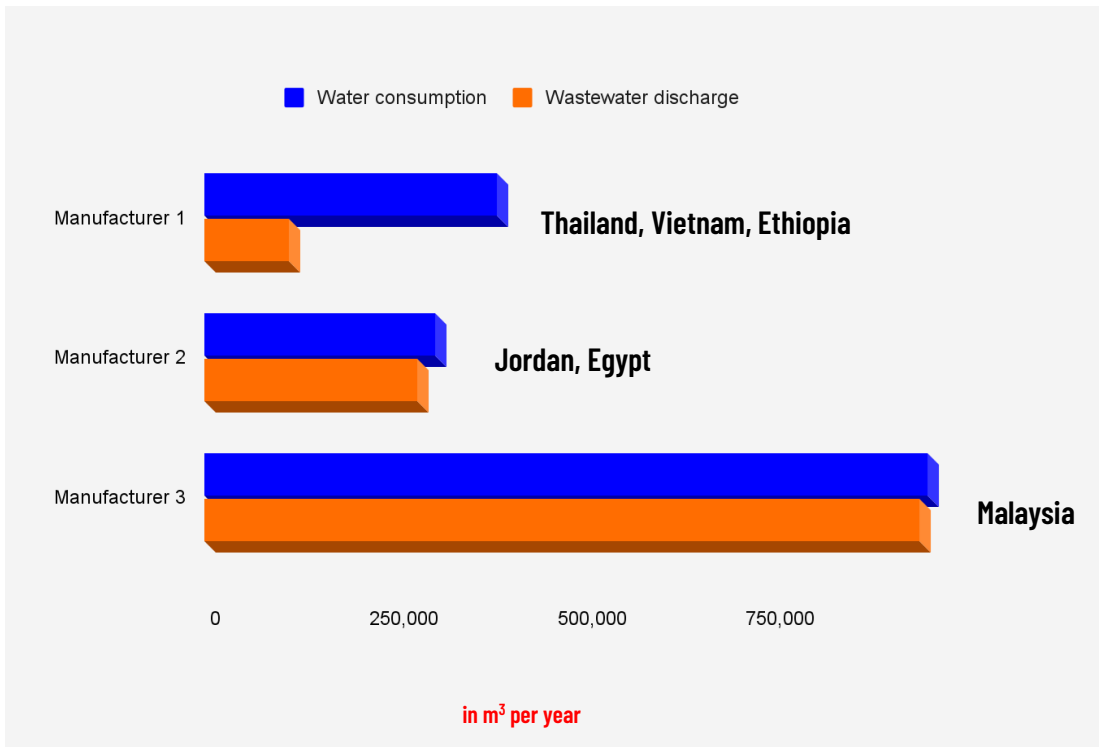
- **Supporting textile waste collection.**
- **Recycling textile waste into merchandise**, with a majority of customers being corporate entities.
- **Contributing to the national recycling system**, which helps divert textile waste to recycling streams instead of landfills.
- **Facilitating partnerships** for redistribution, including donation initiatives.

However, some recyclers noted that there are currently **limited recycling technologies available** for textiles.



Water and wastewater management

Other environmental metrics collected in the survey include **water consumption and wastewater discharge**. Both manufacturers and brands/retailers were asked about their water consumption; however, **the surveyed brands/retailers reported that they do not measure and do not plan to measure their water consumption in the future.**



Some manufacturers provided figures for water consumption at specific locations, as illustrated in the graph on the left, along with the corresponding amount of wastewater discharge from this consumption.

It is important to note that the question on wastewater discharge was posed only to manufacturers.

Brands and Retailer initiatives

Current initiatives for managing unsold products

The top **three initiatives for managing unsold products include discounts, donations, recycling, and refurbishment or repackaging.** A total of six brands/retailers responded to this question, allowing them to select multiple initiatives.



Brands and retailers' efforts in communicating product care and repair

Care Labels: Provides clear garment care instructions.

Social Media: Share product care tips and sustainability initiatives.

Eco Guides: Offer detailed guides to subscribers on sustainable practices.

Website Care Pages: Maintain dedicated sections for product and material care.

Repair & Alteration Services: Encourage product longevity with repair options, including complimentary basic alterations.

Transparent Pricing: Clearly outline costs for repair and alteration services for fair compensation to artisans.

Key quotes

"Our sustainability efforts are driven by a commitment to sustainable practices."

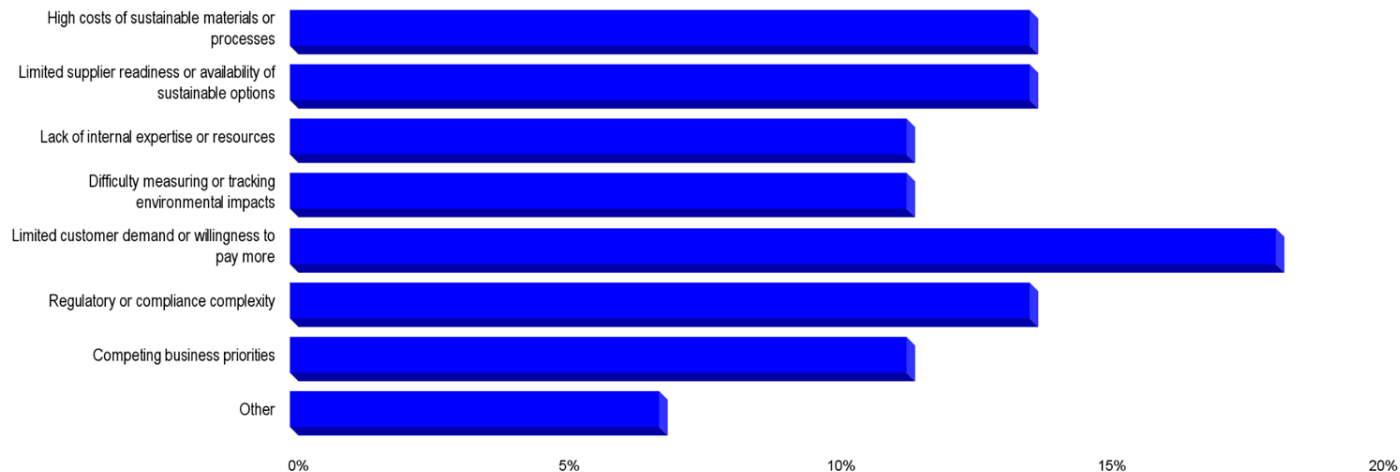
"As a small brand, pursuing sustainable fashion is challenging without significant capital or scale."

"Despite our commitment, grants and support are often limited to larger companies. Marketing higher-quality products also requires considerable effort."

"As a micro-company, we are finding our way forward and seek to understand how upcycling fits within the value chain and its viability as a long-term option in the industry"

Challenges in sustainability and circularity practices

The majority of respondents, both manufacturers and brands/retailers, agree that the main challenge is insufficient customer demand and willingness to pay for sustainable products, which tend to be more expensive. The second challenge is the complexity of regulatory compliance and the limited availability of suppliers that can provide sustainable raw materials.



14

Respondents
out of 35

The 'Other' option highlights several issues, including **a lack of support or incentives for sustainable small brands, limited supplier readiness, restricted availability of renewable energy in certain markets, the absence of Power Purchase Agreements (PPAs) based on annual consumption, limited resources, brands' reluctance to pay more, and challenges associated with decarbonizing process heat.**



3.2 Summary of interview results

Who we engaged

The interviews generated qualitative insights into industry challenges and opportunities, providing the evidence base for Singapore to convene stakeholders, prioritise regional action, and develop ecosystem partnerships that accelerate Singapore & ASEAN's sustainable fashion transition.

70+

fashion companies
contacted for survey and
/ or interview
participation

20

interviews completed
with strategic
Singapore & ASEAN
fashion industry players

50+

surveys from a range of
small to large businesses
across the fashion supply
chain

Face-to-face

engagement with
industry leaders at the
2025 APTEXPO event.

Insights from interview respondents (1/4)

Insight	Description	Barriers/gaps	Opportunities
Sustainability momentum is still customer-driven – local regulation has not yet shifted the market	- Most manufacturers act because Western brands demand compliance (e.g. Higg Index, traceability, wastewater standards). - Local regulation in Singapore & ASEAN countries is improving but remains uneven and largely compliance-oriented rather than strategic (e.g. wastewater in China, but not yet circularity mandates elsewhere). - SMEs lack a regulatory or financial “pull” to invest, creating a two-tier system: large export-oriented firms moving fast, smaller players lagging.	Weak domestic regulation and incentive structures	Regional policy alignment or incentive schemes (e.g. green financing, tax rebates, certification support) to make sustainability viable beyond export compliance.
Regulation is accelerating – but industry readiness, especially SMEs, remains low	- Brands know EPR, carbon reporting, and eco-modulation are coming, but don’t know how to prepare. - Few highlighted that even where EPR exists (France), systems feel unclear and services are lacking. - SMEs and regional players have no playbook for future regulation.	Unclear regulatory pathways and low regulatory readiness across Singapore & ASEAN.	Create a regulatory readiness roadmap, shared EPR templates, and regional policy alignment for textiles.
Water and wastewater remain universal hotspots	- Dyeing and finishing are repeatedly cited as the largest environmental impact areas. - Companies are investing in recycling and treatment technologies, but adoption varies widely. - Some progress (e.g. water reduction and recycling), yet innovation diffusion is slow due to cost and regulatory inconsistency.	Fragmented access to clean tech and limited regional knowledge exchange.	Scale up proven technologies through tech transfer partnerships or shared demonstration projects across Singapore & ASEAN.

Insights from interview respondents (2/4)

Insight	Description	Barriers/gaps	Opportunities
Waste and circularity: post-industrial progress, post-consumer paralysis	- Post-industrial waste recycling is — because it's controlled, traceable, and easier to manage. - Post-consumer waste remains technically and economically unviable — inconsistent supply, lack of sorting infrastructure, and unclear end markets. - Most recycling remains mechanical, not chemical; innovation is nascent and often imported.	Missing ecosystem for textile-to-textile recycling and product take-back systems.	Regional circularity hubs linking post-consumer collection (in consumer markets) with recycling and fibre-to-fibre technologies (in production markets).
SMEs are willing but under-resourced	- Every SME expressed interest and awareness, but face barriers in cost, technical expertise, and supplier leverage. - Small brands struggle to demand certification or sustainable practices upstream, while suppliers are reluctant to invest for low-volume orders. - Collaboration and "shared learning platforms" are widely requested.	Fragmented SME engagement and capacity building.	Create sectoral sustainability frameworks or collective platforms — e.g. pooled certification, shared training, or sustainability "starter kits."
Consumer awareness is rising but still niche	- Growing pockets of eco-conscious consumers, especially among younger demographics and in urban markets (e.g. Thailand's "Nextopia," Singapore's educated base). - Yet price remains the main barrier — sustainability is still a "nice-to-have." - Some local brands show that education and storytelling can shift mindsets, but the market scale is limited.	Weak domestic demand for sustainable fashion.	Public-private campaigns and retail partnerships to normalise sustainable fashion choices.



Insights from interview respondents (3/4)

Insight	Description	Barriers/gaps	Opportunities
The region is scaling production faster than it is scaling responsibility	- Brands are growing regionally while sustainability systems lag far behind (traceability, measurement, governance). - Production expansion—especially into China, SEA, and Turkey—is driven by ease and speed, not environmental criteria. - Even large players admit their supply chains outpace their ability to track, govern, or decarbonise them.	Sustainability capacity hasn't kept pace with rapid production growth.	Create regional governance tools, training, and shared standards to lift the baseline as supply chains scale.
Product quality is becoming a hidden determinant of circularity	- Fast-fashion blends and low-quality textiles are increasingly non-recyclable, regardless of technology. - Recyclers state that poor quality fabrics undermine sorting, economics, and end-market viability. - Brands acknowledge that shifting to better materials raises costs their customers won't accept.	Low-quality, blended textiles that cannot be recycled at scale.	Introduce design-for-recycling guidelines, quality minimums and regional material standards.
Waste systems are designed for volume, not value	- Textile waste handling remains stuck in mixed, low-quality streams — making circularity impossible. - Requirements for source segregation, cleaner feedstock and sorting precision are not yet in place. - Even when brands run take-back schemes, downstream pathways are fragmented and unclear.	Collection systems prioritise volume over material quality.	Shift to value-preserving waste systems: clean collection, contamination controls, fibre sorting, and feedstock standards.
Consumer trust in sustainability claims is fragile and easily lost	- Consumers think donations may end up exported or wasted, reducing participation. - Brands worry about brand fragmentation, fearing sustainability messaging could alienate customers. - Meanwhile, consumer-led sustainability demand is real but inconsistent and highly price-sensitive.	Low consumer trust caused by poor transparency and inconsistent messaging.	Develop Singapore & ASEAN-wide consumer communication standards, impact labels, and transparent reporting.

Insights from interview respondents (4/4)

Insight	Description	Barriers/gaps	Opportunities
Traceability and data capacity are major bottlenecks	- Many companies are only tracking Scope 1 & 2 emissions, with limited understanding or data on Scope 3. - Traceability systems often rely on customers' platforms; SMEs struggle to integrate or afford them. - Auditing and certification are described as "fatiguing" and resource-heavy.	Lack of consistent, affordable digital infrastructure for traceability and GHG accounting.	Shared platforms or industry-wide digital passports that lower costs and standardise reporting for SMEs.
Fragmented effort means everyone wants collective action but no one can start it	- Nearly all stakeholders said they can't solve sustainability alone – whether it's data, waste, materials or SMEs. - But no central platform exists to coordinate roles, technology pilots, or shared research. - Everyone is waiting for a neutral convener – which positions SFC or Singapore as a natural leader.	No neutral, regionally trusted convening platform to unify brands, SMEs, recyclers, policymakers, and tech.	Establish a regional coalition that aligns standards, shares research, and pilots technology.



Key quotes

For small companies like mine, everything is voluntary, and it takes a lot of hustle...with very little motivation or support.

Brand/retailer, Singapore

Technology transfer and pilot-scale investments are critical before scaling. The challenge is identifying the right technologies to transfer and ensuring they're viable as sustainable businesses, not just concepts.

Manufacturer, Thailand

If a few of us worked together, we could actually educate consumers and drive better outcomes — but someone needs to coordinate it.

Recycler, Singapore

Traceability is a huge challenge everywhere... Each brand has its own model — it's really inconvenient for suppliers and the process is very incomplete.

Industry expert

There is currently **no harmonized Extended Producer Responsibility framework** for textiles globally—only for packaging.

Brand/Retailer, Global

We're measuring office emissions first and only Scope 1 and 2 for our factories. The main challenge is building capacity to do it on a broader scale.

Manufacturer, Singapore



Section 4

Strategic positioning recommendations for Singapore



Bringing together the desktop research and stakeholder insights, South Pole provided recommendations for the role SFC and Singapore Enterprises can play to address the current and emerging challenges and opportunities across the Singapore & ASEAN fashion landscape

Regional opportunities for promoting sustainability in the Singapore & ASEAN fashion industry

01

Regional policy alignment and incentive frameworks

“Stronger policy signals in Asia would accelerate adoption — with the right frameworks, companies here are ready to move faster.”

Manufacturer, Global

02

Regional circularity hubs linking post-consumer collection with recycling

03

Technology transfer partnerships and demonstration projects

“Technology transfer and pilot-scale investments are critical before scaling... ensuring they’re viable as sustainable businesses, not just concepts.”

Manufacturer, Thailand

Sectoral sustainability frameworks and collective platforms

04

Shared platforms and industry-wide digital traceability infrastructure

05

“If our customers standardize their data requirements, suppliers can focus on moving the needle rather than doing reporting.”

Manufacturer, Singapore

Public-private campaigns and retail partnerships

06

“Increasing consumer awareness and demand is necessary to achieve economies of scale and lower the costs of sourcing sustainable materials.”

SME brand, Singapore

Four strategic roles to help Singapore enterprises expand locally and across ASEAN

Singapore plays a pivotal role in the region, leveraging its innovation and research strengths to connect trade, sustainability, and technology across Singapore & ASEAN. **Four key roles emerge as major opportunities:**

01

A catalyst

to advocate
and align policy

02

An enabler

of technology
& partnerships

03

A convenor

to co-create standards
& frameworks

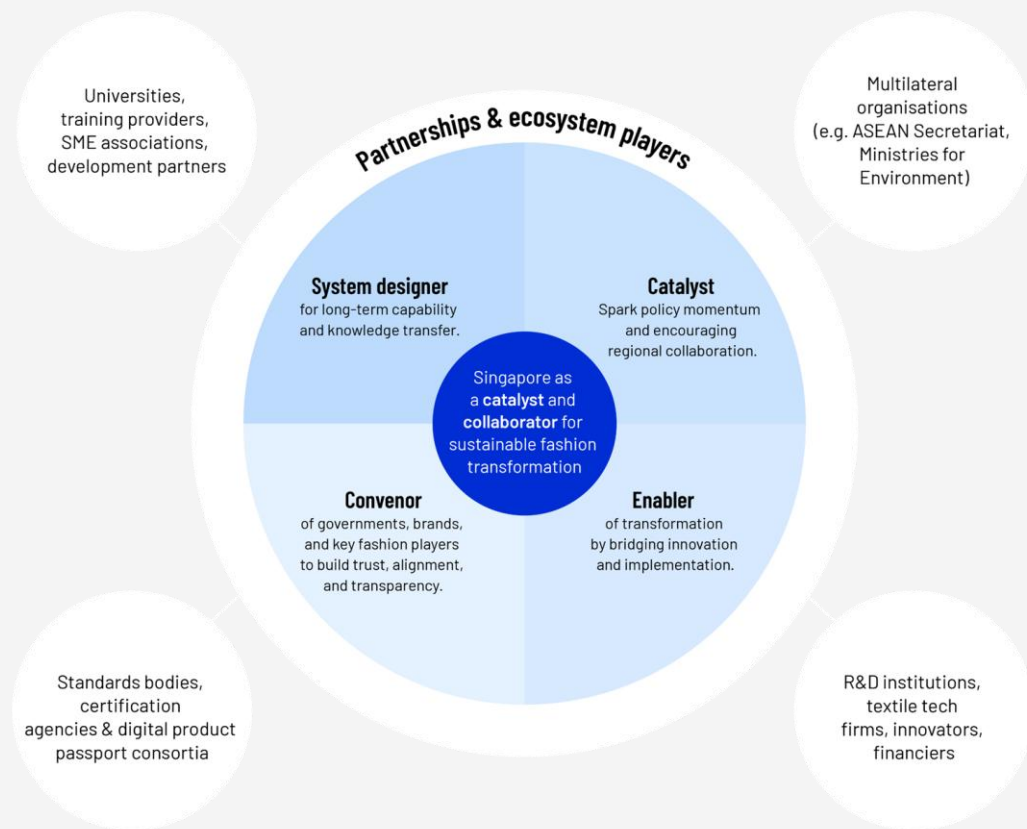
04

A system
designer

of knowledge
& capacity building

Recommended positioning: **Singapore as a catalyst and collaborator for Singapore & ASEAN**

Connecting research, policy, and industry to co-develop scalable solutions for a circular and low-carbon fashion future.



Together, these four roles and a partnership-driven approach position Singapore to transform shared ambition into bold, coordinated action.

Annex 1: Country Deep Dives for Singapore Enterprises

Benchmarking Singapore's Position as a Sustainable Fashion Hub Against Vietnam, Thailand and Indonesia

Country deep dive *Vietnam*

Key takeaways:

- The fashion industry heavily relies on foreign suppliers for materials, accounting for 64% of its sourcing.
- Global sustainability policy highlight increasing pressure for industry-led initiatives to improve sustainability practices.
- Textile waste—both post-industrial and post-consumer—continues to pose significant challenges, exacerbated by limited processing technologies.

National market outlook

The country's textile sector has grown strongly

In 2024, Vietnam's GDP was estimated at USD 476 billion, with apparel and footwear exports accounting for about 15% of the total. The country's textile sector has grown strongly, supported by multiple free trade agreements and its reputation as a producer of higher-value apparel.

Export markets include the US, East Asia & Pacific, Europe, and Japan, while imports mainly come from China, Australia, the US, and South Korea. Key products include natural fibers, polyester, and nylon.

Vietnam's textile industry generates 935 kt of post-industrial waste annually

According to a GIZ study, Vietnam's textile industry generates 935 kt of post-industrial waste annually. Data on post-consumer textile waste is limited, but in 2022, the country produced 26.1 million tonnes of municipal solid waste (MSW), with an estimated 1–5% consisting of textiles.

Additionally, 900 kt of polyester fibers are wasted each year, primarily from the textile sector.

Vietnam's sustainable fashion sector is gaining attention but remains limited

The upcycling trend, popular globally since 2021, is still relatively unfamiliar in Vietnam. Dominated by fast fashion, consumers continue to prioritise low-cost apparel.

While initiatives promoting second-hand clothing exist, challenges remain due to limited traceability in sourcing.



Government policies for sustainable and circular fashion

Vietnam has set ambitious sustainability targets for its textile and footwear industries. **By 2025, the country aims to source 10% of electricity from renewables**, cut energy use by 0.4–0.7% annually, and achieve **15% energy and 20% water reductions in the textile and footwear sectors**. Efforts also focus on resource efficiency, targeting a 5–8% reduction in material use by 2025 and 7% by 2030. At least 20% of fibres are expected to come from recycled polyester and 15% from organic cotton, alongside a rise in eco-labelled products and certifications such as BCI, Oeko-Tex, LEED, Higg Index, ZDHC, and ISO 14001. **By 2030, Vietnam envisions becoming a leading destination for sustainable textile and apparel production.**

1

Decision No. 13/2024/QĐ-TTg: Green Transition for Vietnam's Textile and Footwear Industries

From 1 October 2024, companies must inventory their greenhouse gas emissions, adopt advanced technologies, and utilise clean energy to support sustainable growth. Nearly 100 textile and footwear companies are required to report their emissions, in line with Vietnam's broader net-zero goals.

2

EPR regulations exist, but textiles are not yet formally covered

The Extended Producer Responsibility (EPR) system in Vietnam currently covers packaging, batteries, electronics, lubricants, tires, and vehicles, but does not yet include textiles. However, policymakers have indicated that textiles may be added as the country advances its circular economy initiatives.

3

Government incentives:

The government provides tax exemptions on imported textile machinery and corporate tax reductions for manufacturers that adopt sustainable practices. Enterprises are also supported in implementing energy-saving measures, targeting at least a 10% annual reduction in energy consumption to improve production efficiency and reduce environmental impact.

4

On February 28, 2025, Vietnam's Ministry of Natural Resources and Environment (MONRE) issued **Circular 06/2025/TT-BTNMT**, introducing the new National Technical Regulation on Industrial Wastewater (QCVN 40:2025/BTNMT). The regulation includes specific standards for wastewater from textile dyeing, recognising the sector as a major contributor to water pollution.

Environmental performance and circularity challenges of Vietnam's fashion industry

High reliance on imported material

With over 60% textile materials imported from countries like China. In 2023, Vietnam imported 1.5 million tons of cotton from the US and India, making the sector vulnerable to global supply chain disruptions.

With this, Vietnam struggles to ensure sustainable sourcing due to limited traceability.

Energy-intensive processes

The apparel and footwear industry in Vietnam accounts for 8% of industrial energy demand, generating about five million tons of CO₂ annually. The sector remains highly reliant on coal (12% of plants) and grid electricity (93% of facilities).

Rising rice husk prices have pushed some suppliers to switch to uncertified wood waste, which, when biogenic emissions are considered, can have a greater impact than coal and create both environmental and reputational risks.

High water use

As of 2023, Vietnam's textile industry consumed over 2 billion cubic meters of water annually, with wet processing as the main driver of high water use and pollution.

The textile sector is among the top industries in Vietnam contributing to high water pollution loads, worsening both water scarcity and contamination

Poor wastewater treatment

About 51% of wastewater treated at the centralised Wastewater Treatment Plant (cWWTP) comes from the food industry, and 49% from textiles, plastics, mechanical, and other sectors. Nationally, textiles account for 3% of total wastewater discharge.

Many factories still struggle to meet standards due to limited regulatory understanding and the high costs of investing in and maintaining effluent treatment plants (ETPs).

Fragmented waste management system

While Vietnam generates large volumes of pre-consumer textile waste, collection and sorting remain fragmented. About 60% is sorted and recycled through basic mechanical or thermo-mechanical processes, mostly resulting in downcycled, lower-quality products. The remaining 40% is sent to waste-to-energy plants or disposed of through other means.

No chemical recycling options are available. Microplastic leakage is significant, with 1.1 kt of textile fibres out of 7.8 kt total leakage.

Impact of global sustainability and circularity regulations initiatives

While Vietnam is emerging as a global hub for textile manufacturing, growing regulatory pressure from major markets such as the EU and the US—through frameworks like CBAM, the EU Strategy for Sustainable and Circular Textiles (SSCT), CSRD, CSDDD, and the US Uyghur Forced Labor Prevention Act—poses challenges to the country's readiness for sustainability and circularity compliance.

These regulations drive demand for sustainable sourcing, manufacturing, and responsible end-of-life management. Although Vietnam has policies supporting these goals, information on implementation progress remains limited. Most advances are industry-led, primarily driven by large corporations, while participation among smaller enterprises remains modest.

Sources: [Medina, 2025](#); [World Wide Fund for Nature, 2021](#); [European Commission, 2022](#)



Local industry efforts to meet sustainability requirements

In June 2024, the **Green Tech Landing Pad launched five pilot projects to advance sustainable textile technologies in Vietnam**, in collaboration with GIZ, the National Innovation Center (NIC), and the Ministry of Planning and Investment. The initiatives showcase a range of innovative solutions, including IoTeamVN's energy management system, Enedig Kft's cloud labor cost tool (timeSSD®), Hoang Ha's waste heat recovery system, ECOSOL's pineapple-based fabrics, and BlockTexx's recycling solutions for polyester and cellulose.

1

Material traceability

As Vietnam heavily relies on imported materials for textile production, tracking material traceability has become a challenging task. While there is limited information on industry examples that have adopted such practices, the fashion sector has initiated discussions with the government to promote the adoption of digital technologies for traceability.

These efforts also emphasise the need to support small and medium-sized enterprises (SMEs), which represent the dominant segment of the textile industry.

Sources: [VietnamPlus, 2025](#); [Tran, 2023](#); [World Wide Fund for Nature, 2021](#); [Deutsche Gesellschaft für Internationale Zusammenarbeit, 2025](#); [Ken Research, 2024](#)

2

Alternative materials

As the country hosts several major textile companies, some industries have been actively conducting research and development (R&D) on alternative materials, including:

- **Faslink** invests heavily in R&D, offering green textiles made from lotus, coffee, mint, and bamboo, which typically have a lower environmental impact than traditional fabrics.
- **Spiber** produces spider silk proteins through precision fermentation to create next-generation silk.
- **Bolt Threads** uses mycelium to produce leather and precision fermentation to create spider silk proteins.

3

Low-emission operations

Renewable energy adoption is increasing, particularly solar power, taking advantage of Vietnam's abundant sunlight.

- **The 100% Danish-owned Specter** garment factory in An Giang was recently completed at a cost of US\$17 million. The factory aims to reduce its emissions by approximately 1,600 tonnes of CO₂ per year by partially operating on solar energy.
- Built in 2019, **Crystal Martin's** rooftop solar system, with 1,800 PV panels, is expected to save around 550,000 kWh and cut factory emissions by about 500 tCO₂e annually.

4

Wastewater management

Currently, there are no plans to develop large industrial parks with centralized wastewater treatment systems for the textile dyeing stage, posing a significant environmental challenge. However, the Vinatex-affiliated Bao Minh Industrial Park (Nam Dinh)—a specialized textile hub in northern Vietnam—is transforming its production processes to reduce pollution and implement wastewater treatment and reuse systems.

5

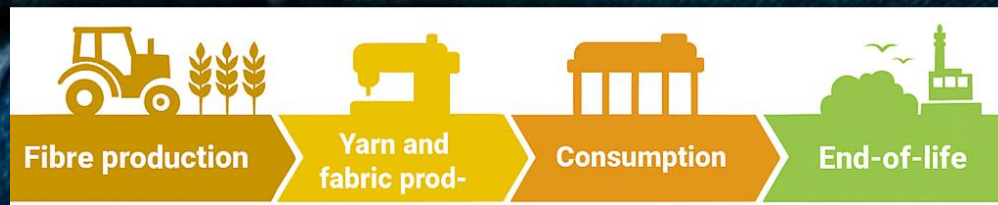
Textile recycling

Vietnam is emerging as a hub for advanced textile recycling due to its vertical supply chain capabilities and abundant pre-consumer textile waste. Key players include:

- **GDI Textile Co., Ltd (Tay Ninh)** – manufactures GRS-certified recycled polyester staple fibres.
- **Tan Nam Trung (Long An)** – fully Vietnamese-owned, recycles textile waste into polycotton blends.
- **Hansae Group (Korea) & Hanosimex (Hanoi)** – recently partnered to produce recycled textiles, with EU demand expected to reach 4,000 tons.

Local manufacturers are estimated to produce 200 million metres of recycled fabric each year.

Relevant actors in Vietnam's textile sector



Institute & Govt. agencies

Hanoi Industrial Textile Garment University (HICT)
 Vietnam Textile Research Institute (VTRI)
 HCMC University of Technology (HUTECH, VNU)
 Ministry of Industry and Trade (MOIT)
 Provincial Departments of Industry and Trade (DOITs)

Associations:

Vietnam Textiles and Apparel Association (VITAS)
 Vietnam Cotton and Spinning Association (VCOSA)
 Association of Garments, Textiles, Embroidery and Knitting (Agtek)

Notable listed companies:

Vietnam National Textile & Garment Group (VGT VN)
 Song Hong Garment JSC (MSH VN)
 TNG Investment and Trading JSC (TNG VN)
 Century Synthetic Fiber Corporation (STK VN)
 Thanh Cong Textile Garment Investment Trading (TCM VN)

Country deep dive

Thailand

Key takeaways:

- Despite a downturn in the textile industry, the government remains committed to prioritizing textiles as a key sector.
- Government-led initiatives include grants, investments, and the development of infrastructure to support the industry.
- Microplastic pollution from fibers has emerged as a critical environmental concern.
- Efforts are underway to increase the use of recycled materials within the textile industry, promoting sustainability.

National market outlook

Thailand's textile industry contributed 1.22% to GDP in 2019

Key export destinations including Singapore, ASEAN, the US, Europe, and Japan. In 2022, textile exports reached USD 5.55 billion.

The sector is dominated by apparel manufacturing (35%), followed by textile manufacturing (21%), dyeing and finishing (14%), and spinning (9%), while fibre production remains minimal. Synthetic fibre, silk and cotton are Thailand's key textile products. There were 2,355 textile and garment establishments in 2022, marking a decline from the previous year, reflecting gradual industry consolidation.

Efforts in Thailand's textile industry have focused on modernising equipment and improving production processes to enhance efficiency, competitiveness, and product quality.

Textile waste accounts for around 1% of the national waste composition

Thailand's textile industry is a notable contributor to plastic pollution, primarily through synthetic fibres used in production. Textile waste accounts for around 1% of the national waste composition. In 2023, the country generated 26.95 million tonnes of municipal solid waste, equivalent to roughly 0.27 million tonnes (270,000 tonnes) of textile waste.

Due to limited waste management and recycling systems, textile waste contributes significantly to macro- and microplastic pollution, with an estimated 19 kilotonnes of textile fibres leaking into the ocean each year.

Second-hand fashion emerging as a key alternative

Thai retailers are increasingly tapping into the booming second-hand luxury market, which was valued at around 40 billion baht in 2023 and is projected to grow by 12% annually, driven by global sustainability trends.

While awareness of the environmental benefits of sustainable and organic clothing is rising, high costs remain a barrier to wider adoption among Thai consumers. The market for clothing made from recyclable materials is also expanding, and is expected to reach 1.3 billion baht by 2032, representing about 0.5% of the total clothing market value. A growing number of entrepreneurs are entering the recycled-material fashion sector.



Environmental performance and circularity challenges of Thailand's fashion industry

Material sourcing

Thailand heavily relies on imported materials for its textile production.

Around 32.2% of raw materials are sourced from countries such as China and Vietnam.

Although Thailand has a strong agricultural base, cotton farming has never been a major domestic industry. As a result, Thai cotton yarn and fabric manufacturers depend largely on cotton imports from the United States, Brazil, and Australia, making it challenging to trace and assess the associated environmental impacts along the supply chain.

Manufacturing & production

Thailand's textile industry places a strong emphasis on synthetic fibre production, leading to intensive use of crude oil and petroleum-based raw materials.

In 2017, the industry consumed a total of 958.62 kilotonnes of oil equivalent (ktoe) — with 62.55% from electricity and 37.45% from thermal energy.

The industrial sector, including textiles and apparel, contributed about 28% of Thailand's total greenhouse gas (GHG) emissions in 2019, primarily driven by natural gas consumption. Only 10% of the sector's energy came from renewable sources, and a further 2.2% from large domestic hydropower, highlighting the limited penetration of clean energy in textile production.

Water & wastewater management

Thailand has around 201 dyeing factories, primarily located outside Bangkok. The textile industry is estimated to generate approximately $2.55 \times 10^6 \text{ m}^3$ of wastewater annually, containing various toxic pollutants. A key contaminant identified is nitrate ($\text{NO}_3\text{-N}$), commonly introduced through sodium nitrate used in dye baths to enhance fibre dyeing performance.

In terms of water consumption, cotton production is highly water-intensive, yet most cotton used in Thailand is imported, making domestic water use difficult to quantify. Currently, no national data is available on overall water consumption in the textile sector, reflecting a major data gap in resource management and monitoring.

Textile waste management

Thailand has implemented reuse, reduce, and recycle initiatives in the textile sector; however, these efforts remain fragmented and limited in scale. A major gap persists in the infrastructure for textile waste recycling, particularly for synthetic materials. Currently, no polyester fibre recycling facilities exist in the country, and approximately 30% of polyester waste remains uncollected, making it a significant source of plastic leakage.

Although second-hand clothing markets are thriving, there is no clear evidence that they contribute to a reduction in overall textile waste, as the origin and circulation of these garments remain under investigation.

Government policies for sustainable and circular fashion

The Thai government envisions positioning Thailand as a regional textile hub and prioritising the fashion sector as a key driver of international investment. To support this, several initiatives and policies have been implemented to strengthen the industry, enhance competitiveness, and attract global stakeholders.

1

3–8 Years Corporate Income Tax Exemption

Businesses in fiber, yarn, fabric, garments, household textiles, and leather goods may be eligible for 3–8 years of corporate income tax exemption for promoted activities that include R&D. In addition, R&D and intellectual property (IP) registration costs can be deducted from taxable income, supporting innovation and competitiveness.

2

Sustainability Certifications in Thailand

Thailand has no regulations specifically on fashion sustainability, but manufacturers can obtain voluntary certifications such as WRAP, GOTS, Bluesign, OEKO-TEX, and the Thai Green Label, which recognises products with minimal environmental impact. Some businesses receive incentives, such as waived annual factory license fees, for obtaining them.

3

Extended Producer Responsibility (EPR)

Thailand's EPR regulation is currently under development. In 2024, the draft underwent intensive stakeholder consultation, with a focus on packaging and e-waste. It is unclear whether textiles will be included in the final plan. While textiles are not explicitly covered, the sector could be indirectly impacted due to its high use of plastic polymers.

4

Favorable trade policy across ASEAN

Tariff reductions for clean technologies help encourage adoption by industries, including textile manufacturers. For example, tariffs on wastewater treatment equipment were eliminated in January 2013, while zero tariffs on solar cells since 2007 significantly improved their affordability and uptake.

5

Thailand has mandated five Thai Industrial Standards (TIS) for synthetic dye products, effective from August 19, 2023. These standards cover various types of synthetic dyes, including direct, reactive, vat, sulfur, and acid dyes. The regulations aim to ensure product quality and safety within the dye industry.

National hotspots, infrastructure, and policy readiness for sustainability and circularity

Difficult to trace the environmental footprint of textiles

Digital infrastructure remains limited in Thailand, both in textiles and other sectors, due to high initial setup costs and regulatory misalignments, which hinder widespread adoption among SMEs.

The Thai government targets a 30% emission reduction in the textile industry

Under the Energy Efficiency Plan (EEP 2015–2036) and the Alternative Energy Development Plan (AEDP 2015–2036). While AEDP also encourages renewable energy use, information on clean energy adoption within the textile sector remains limited.

Major contributor to wastewater pollution

The Thai government has invested in treatment facilities within industrial estates, such as the Lumpo Wastewater Treatment Plant, which successfully purifies water to the extent that aquatic life can thrive in aquariums using treated effluent. However, with around 95% of textile factories being small-scale, transporting wastewater to these central facilities remains economically challenging.

Limited textile waste management

Thailand has begun clothing collection initiatives, but fibre recycling remains limited due to technical challenges in separating blended fabrics.

The government promotes domestic rPET production, targeting 250,000 tonnes annually, with textiles using about 60%.



Industry initiatives driving sustainability and circularity in Thailand

1

Digital technology

Thai Acrylic Fibre uses fibre trace technology with an embedded luminescent ID, creating a digital passport that tracks fibres from production to finished garments.

2

Alternative materials

Tohsang Cotton Village is a female-led cotton textile producer and learning centre in Kongchiam, Ubon Ratchathani.

3

Alternative materials

Taktai is a pioneer in sustainable fashion, innovating with natural materials such as bamboo fibres.

4

Alternative materials

Maddy Hopper is a designer of footwear from repurposed plastic bottles.

5

Alternative materials

Circular Club embraces circular fashion by upcycling fabric scraps and surplus materials into new garments.

6

Waste recycling

SC Grand mechanically recycles up to 400 tonnes of textile waste monthly into new fabrics, sorting by material and colour to avoid re-dyeing. It also partners with factories across Southeast Asia to collect and recycle textile waste.

Impact of global sustainability and circularity regulations

Thailand's textile industry has experienced a market decline in recent years, largely due to rising competitiveness from neighbouring countries

such as Vietnam and Cambodia. While this presents challenges, the Thai government continues to support the industry in aligning with global sustainability requirements and maintaining access to international markets.

Foreign regulations such as the EU Strategy for Sustainable and Circular Textiles (SSCT), CBAM, CSRD, and CSDDD are expected to influence Thailand's textile sector. However, **the extent of their impact remains unclear**. In response, the government has encouraged exporters to adopt ecolabels such as the Global Organic Textile Standard (GOTS), Green Label Thailand, the EU Ecolabel, and Bluesign. To incentivise adoption, measures such as factory licence fee waivers have been introduced. These voluntary sustainability standards enhance market access, although limited certification options and complex procedures remain barriers.

Given that most Thai textile enterprises are SMEs, the government also provides financial support mechanisms, including credit facilities, guarantees, and loans for business expansion, capital goods exports, and participation in international trade fairs to promote investment and export growth.

Sources: [Kohan Textile Journal, 2024](#); [One Planet Network, n.d.](#)



Relevant actors in Thailand's textile sector



Ministry of Commerce
 Ministry of Industry
 Ministry of Natural Resources and Environment
 Board of Investment
 Thailand Textile Institute (THTI)
 Thai Industrial Standards Institute (TISI)
 Office of SMEs Promotion (OSMEP)
 Textile Industry Club
 Export-Import Bank of Thailand (EXIM Thailand)
 Multiple commercial banks in Thailand (e.g. Bangkok Bank, Siam Commercial Bank and Kasikornbank)

Thai Weaving Industry Association (TWIA)
 The Association of Thai Bleaching Dyeing Printing and Finishing Industries (ATDP)
 Thai Garment Manufacturers Association (TGMA)
 Mae Fah Luang Foundation under Royal Patronage (MFLF)
 Thai Style Solutions initiative
 IKAT/eCUT – sustainable textile industry project

Upstream (fiber production): Major synthetic fiber producers include Indorama Polyester Industries, Thai Rayon, Thai Toray Synthetics, Thai Polyester, and Polyplex (Thailand).

Midstream (textiles): Leading textile manufacturers are Luckytex, Jong Sitt, Nan Yang Knitting Factory, Kangwal Textile, and Chiem Patana.

Downstream (apparel): Prominent apparel manufacturers include Central Trading, Jaspal, Thai Wacoal, Nanyang Garment, and Hi-Tech Apparel.

Notable Thai brands and designers with global recognition include NaRaYa, Jaspal, Sretsis, Disaya, Vatanika, Flynow, DoiTung, and Sirivannavari, the clothing line of HRH Princess Sirivannavari.

Country deep dive *Indonesia*

Key takeaways:

- The textile industry is currently experiencing challenges, which are being influenced by trade tariffs impacting domestic operations.
- Approximately 2.3 million tons of textile waste are generated annually, with limited recycling efforts currently in place.
- Although technology and capacity for recycling exist, much of the textile waste still ends up in landfills.
- The government aims to transform the textile industry into a more circular business model, promoting sustainability and waste reduction.

National market outlook

Since the 1920s, **the textile industry has been a strategic sector in Indonesia**, spanning from upstream suppliers to downstream producers. However, textile machinery manufacturing remains limited, with imports largely from India and China. Sustainable fashion is emerging as the industry begins to shift from linear to circular models, though progress and impact remain modest.

The textile industry is a strategic investment sector in Indonesia

employing nearly 4 million people—mostly in Java—and contributing 5.84% to national GDP in early 2024. With annual exports exceeding USD 13 billion, Indonesia ranks among the world's top 10 textile exporters, serving major markets such as the United States, Japan, Germany, and emerging regions in the Middle East and Africa.

In Indonesia, the textile industry generates around 2.3 million tonnes

of waste annually in 2024, projected to reach 3.9 million tonnes by 2030. While data distinguishing pre-industrial and post-consumer waste are limited, overall volumes are expected to grow as the sector remains largely linear and resource-intensive.

As awareness of the environmental impact of fashion grows

public interest in sustainable clothing is rising in Indonesia. While overall understanding remains limited, younger millennials are showing stronger eco-conscious habits, such as buying “green” products and reusing clothes. According to a YouGov survey, 66% of Indonesians have given unwanted clothes to friends or family, and 50% have donated them—signs of a growing circular mindset in fashion consumption.



Government policies for sustainable and circular fashion

Indonesia is committed to reducing its emissions by 31.89% by 2030 (compare to BAU emission), with measures that include the adoption of renewable energy and improvements in energy consumption patterns across various sectors, including textiles. The main focus is on the weaving and dyeing processes, which are heavily dependent on thermal energy derived from fossil fuels.

In parallel, the country has issued a *National Circular Economy Roadmap* that includes the transition of the textile sector. A key milestone set for 2025–2049 is to establish a sustainable ecosystem for the textile industry, which is currently characterised by an intensive linear production model.

1

Tax & Investment Incentives

The textile and garment sector in Indonesia qualifies for tax and investment allowances, which include a 30% reduction of taxable income based on total investment spread over six years. Eligible investors may also receive accelerated depreciation/amortisation, loss carry-forward up to 10 years, and a 10% dividend withholding tax for non-resident shareholders.

2

EPR Regulation

Currently applies only to packaging waste, but textiles are being considered for inclusion as waste volumes continue to rise.

3

Green Machine Standard

The Indonesian government is developing a standard/guidance for machines with low energy consumption. However, only eight industries have adopted these types of machines so far.

Environmental performance and circularity challenges of Indonesia's fashion industry

Material sourcing

According to the WTO, **49% of Indonesia's textile inputs come from foreign suppliers**. Although alternative local materials exist, their use remains limited due to high costs and logistical challenges across the archipelago.

In addition, there is **limited information on the digital transformation of textile industries**, particularly in using technology to trace the environmental footprint of materials.

Energy consumption

A study identified energy-intensive hotspots in Indonesia's textile industry, particularly in spinning, weaving, and dyeing. **The sector still relies on fossil fuels, and no specific data exists on its GHG contribution**, though the overall manufacturing sector accounts for 28% of national emissions.

Some large textile corporations have begun integrating solar panels into their production processes.

Water pollution

Indonesia ranks second globally for water pollution from textiles. The Citarum River, flowing through Bandung, West Java, is among the most polluted rivers worldwide, carrying chemical effluents from nearby textile industries.

Waste management

The government estimates that the **textile industry generates 2.3 million tonnes of waste**, of which 462,000 tonnes are post-consumer (approx. 20%), and only 12% is recycled.

Most textile waste is landfilled or openly burned. The garment industry generates 10–20% pre-consumer waste, with only a small portion reused as material input.

Industry initiatives driving sustainability and circularity in Indonesia

1

Alternative materials

MYCL is a circular start-up providing eco-friendly alternative raw materials.

By processing agricultural waste such as empty palm fruit bunches, wood powder, and sugarcane bagasse, MYCL produces sustainable textile materials that reduce waste and dependence on non-renewable resources.

2

Renewable energy

Duniatex is reducing its carbon footprint by investing in renewable energy and energy efficiency, including installing solar panels at several production facilities to cut fossil fuel use and greenhouse gas emissions.

3

Renewable energy

PT Indo Kordsa Tbk installed 8,800 rooftop solar modules across six textile facilities, generating 4.8 MWp and 6,800 MWh annually, cutting 5,400 tons of CO₂—equivalent to planting 163,000 trees.

4

Recycling

Pable promotes circularity by recovering threads from pre-consumer textile waste and engaging micro and small weavers to produce recycled fabrics in Indonesia. It can recycle up to 2,000 metric tonnes of waste monthly, reducing reliance on virgin materials, lowering emissions, and minimising chemical and water use in production.

5

Downcycling

PT. Superbtex processes textile waste into insulation materials for the automotive and construction industries.



Impact of global sustainability and circularity regulations

While both the government and industry recognise the global push for sustainability, **Indonesia's textile sector is facing a crisis driven by declining competitiveness and lower demand.** The government's decision to raise import quotas has made cheaper textiles from countries like China more appealing to consumers.

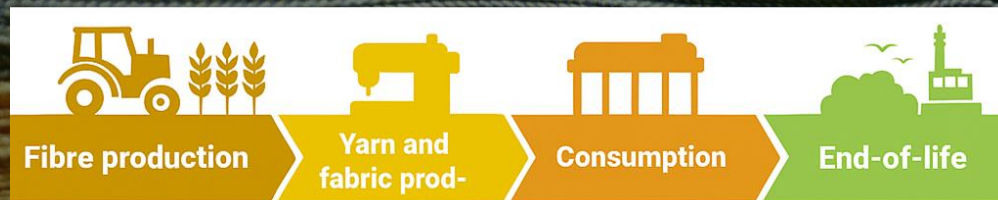
At the same time, **new US tariffs have added pressure, particularly as the US remains a key export market.** Rising wages, high energy costs, and ongoing logistics challenges have further strained the sector.

Indonesia's reach into alternative markets remains limited – the EU accounts for only about 12% of exports, and Canada less than 3%. As the industry stands at a crossroads, global sustainability trends could serve as a catalyst for transition towards a more sustainable and circular textile system. However, **a significant gap persists in the national sustainability ecosystem, and domestic demand for circular products remains niche.**

Sources: [Pane, 2025](#)



Relevant actors in Indonesia's textile sector



Indonesia's National Development Planning Agency (Bappenas)
Ministry of Industry
Ministry of Environment & Forestry
Ministry of Trade
Ministry of Tourism and Creative

Ketua Umum Asosiasi Pertekstilan
Indonesia (API) Ketua Rantai Tekstil
Lestari (RTL)

Notable listed companies:

PT Asia Pacific Fibers Tbk
PT Indo-Rama Synthetics Tbk
PT Sri Rejeki Isman Tbk (Sritex)
PT Ever Shine Tex Tbk
PT Pan Brothers Tbk
PT Tifico Fiber Indonesia Tbk.

Deep dive Singapore

National market outlook

Singapore Textile Industry

Singapore's textile industry is relatively small compared with neighbouring countries such as Vietnam and Indonesia. The country is better known for its role in global supply chains rather than large-scale manufacturing. In 2023, Singapore exported \$2.15 billion worth of textile products. The market offers a diverse range of materials, including natural fibers like cotton and silk, as well as synthetics such as polyester and nylon. Most imports for textile and clothing come from China and Vietnam, while the top export destinations include Indonesia, Malaysia, Australia, Japan, and the UAE.

Textile Waste in Singapore

Singapore's textile industry covers manufacturing, assembly, and retail, but data on total waste generated during these processes is limited. The NEA estimated that in 2023 the country produced 211,000 tonnes of textile waste, of which only 2% was recycled, with the remainder largely incinerated.

Sustainable Fashion in Singapore

Over the past 12 months, Singapore ranked second after New Zealand for interest in sustainable fashion, according to Google Trends. The sector is gaining traction, with 7 in 10 Singaporeans open to upcycling, recycling, or swapping clothes. A YouGov survey found that 36% of consumers have purchased at least one sustainable fashion product. However, barriers remain: many consumers don't know where to buy, are concerned about prices, or are skeptical of sustainability claims. Meanwhile, the adoption of digital technologies such as AI and ERP systems is beginning to emerge in Singapore's fashion industry.



Government policies for sustainable and circular fashion

Singapore has **set a national target to achieve net-zero emissions by 2050, supported by a carbon tax and a renewable energy target of 15% by 2030**. While there are no textile-specific obligations outlined in relation to these goals, the industrial sector as a whole accounts for nearly 50% of the country's total greenhouse gas emissions.

To address this, the government has **implemented a mandatory energy management system** for industrial facilities to improve efficiency and reduce emissions. However, there are **currently no dedicated targets or regulations promoting sustainable procurement within the textile sector**, aside from stringent import and export requirements emphasizing product origin and traceability.

1

EPR Regulation

Singapore currently does not have an EPR scheme specifically for textiles. At present, the EPR framework focuses on e-waste, while the EPR for packaging is under development. Textile companies with an annual turnover exceeding SGD 10 million that use packaging in their operations may fall under the upcoming packaging EPR obligations. While there is no textile-specific regulation yet, businesses in this sector should remain attentive to evolving policies and ensure compliance with import and export requirements, particularly for key markets such as the United States.

2

Water demand and recycling

Some of Singapore's water demand is met through imports from Malaysia. In response to increasing water scarcity, the government has been proactively promoting water sustainability through the NEWater programme, which treats and recycles used water for reuse. Additionally, Singapore encourages industrial users to conserve and recycle water by implementing legislation and providing economic incentives to enhance overall water efficiency.

Environmental performance and circularity challenges of the Singapore's fashion industry

Upstream emissions

According to studies by the Singapore Fashion Council (SFC), the fashion industry generated approximately 3,693 thousand tonnes of CO₂e in 2019. The majority of these emissions originated from upstream production activities—particularly yarn production, fabric manufacturing, and product assembly—which together accounted for about 39% of total emissions. Additionally, the incineration of textile waste further contributes to the overall greenhouse gas emissions across the textile value chain.

Centralized wastewater management

Singapore operates a centralized wastewater treatment system, requiring all industries discharging trade effluent—including textiles—to obtain permits and comply with strict effluent standards set by the Public Utilities Board (PUB). Companies exceeding specified limits for parameters such as BOD, TSS, or COD may opt into the Trade Effluent Fee (TEF) scheme, which allows controlled discharge within approved thresholds while paying fees proportionate to pollutant load and discharge volume.

Textile waste recycling

Singapore's textile recycling rate is currently very low, ranging only between 2% and 4%, with the majority of this waste being incinerated. A significant challenge is the limited information available concerning pre-consumer waste generated during the production process. Despite these hurdles, initiatives are emerging from industries, notably through the setup of textile waste collection drop boxes.

Furthermore, the Sustainable Textile Research Centre, a collaboration involving industry and Nanyang Technological University, is working to accelerate recycling solutions within the country. However, significant obstacles to boosting domestic recycling persist, primarily the limited avenues for both recycling and export and the economic strain caused by high operating costs coupled with the decreasing prices for recycled textile materials.

Industry initiatives driving sustainability and circularity in Singapore

1

Textile recycling

Greensquare, a company improving recycling in Singapore, is partnering with Fraser Property to set up drop-off points for old clothes and textiles. Funded by the SG Eco Fund, Greensquare sorts textile waste by type, condition, and use. Good clothes are exported as second-hand items, while other materials are repurposed into cleaning rags or industrial cloth.

2

Sustainable fiber technology

Asahi Kasei, a maker of plastic and synthetic rubber, supplied its Microza hollow fiber filtration membrane technology to Singapore's Changi NEWater Plant, the country's largest sewage recovery facility. Microza offers energy savings over older distillation methods and reduces the need for filtration aids like diatomaceous earth, lowering industrial waste generation.

3

Clothing collection

Cloop is a social enterprise aiming to "close the fashion loop." They run textile-collection drives and place public recycling bins ("yellow bins") across Singapore for people to donate unwanted clothes, bags, shoes, linens, etc. Clean, dry items are collected for reuse, upcycling or recycling.

4

Sustainable textile research

RGE-NTU Sustainable Textile Research Centre (SusTex) — a collaboration between a major textile-fibre producer and a local university (Nanyang Technological University, NTU). It's funded to develop improved textile-recycling technologies, better mixed-fibre separation, eco-friendly dye removal, natural dyes and next-gen sustainable materials.

Please note: these are only selected examples of industry initiatives in Singapore.



Annex 2: Relevant global standards and initiatives

Relevant global standards and initiatives

UN Fashion Charter for Climate Action: A COP24-launched roadmap calling for net-zero emissions by 2050. It brings together brands, retailers, and value-chain stakeholders globally to coordinate climate action efforts. Focus is climate.

The Fashion Pact: A CEO-led global alliance tackling climate, biodiversity, and oceans.

Global Fashion Agenda (GFA): A Copenhagen-based non-profit powering the Global Fashion Summit and initiatives like the Fashion CEO Agenda. It serves as a catalyst for sustainability leadership and systemic change across the industry.

Ellen MacArthur Foundation (EMF): accelerates the transition to a circular economy by working with businesses, governments, and academia to eliminate waste and pollution, circulate products and materials, and regenerate nature.

Fashion for Good: An innovation platform that incubates sustainable fashion technologies and encourages collaboration across the industry backed by education and an innovation museum in the Netherlands.

Sustainable Apparel Coalition / Cascale: Known for the Higg Index, a suite of tools assessing environmental and social performance across apparel, footwear, and manufacturing.

Textile Exchange: drives sustainable material sourcing and climate action in the fashion industry through benchmarking and guidance

Asia Clean Energy coalition: promotes renewable energy adoption in Asian supply chains by advocating for enabling policies and corporate collaboration.

Apparel Impact Institute: non-profit that identifies, funds, and scales proven environmental solutions in the apparel and footwear industry to reduce carbon emissions

Watch & Jewellery Initiative 2030: An alliance formed to drive sustainable action in the watch and jewellery sectors, convening brands like Cartier and Kering

IFRS® Sustainability Disclosure Standard: Industry-based guidance on implementing IFRS S2 Climate-related disclosures for textile and apparel industries.



Annex 3: Bibliography

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