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Sustainability in fashion

Sri Lanka apparel and textile case study

GS1 Apparel
T-SHIRT

Size: L Colour: White
Product number: 6490



The Asian Development Bank (ADB)

The ADB is a regional development bank, which has 68 member countries. It aims to promote economic and social development in Asia and the Pacific. It provides financial assistance, technical assistance, and policy advice to its member countries to support their efforts in reducing poverty and improving living standards. The bank focuses on areas such as trade, infrastructure development, education, healthcare, agriculture, and environmental sustainability.

ADB’s Trade and Supply Chain Division (TSCD). TSCD aims to make global trade and supply chains greener, inclusive, resilient, transparent, and socially responsible, by providing loans, guarantees and other risk solutions (trade and supply chain financing).

GS1 believes in the power of standards to transform how we work and live

We create a common foundation for business by uniquely identifying, accurately capturing, and automatically sharing vital information about products, locations, and assets.

We enable visibility through the exchange of authentic data.

We empower businesses to grow and improve efficiency, safety, security, and sustainability.

- We are:**
- neutral and not-for-profit
 - user-driven and governed
 - global and local
 - inclusive and collaborative.

This report is a collaboration between Asia Pacific GS1 members with support from the GS1 Global Office.

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Acknowledgements



Brandix Lanka Limited

Afham Ali, Gimhani Punnyasoma, Jarook Mohamed, Dinush Pahathkumbure, Oshada Senanayake, Nirmal Perera, and the team.

As one of the single largest apparel exporters in Sri Lanka with an annual turnover exceeding USD1.2 billion, Brandix employs over 43,000 people across 38 manufacturing facilities in three countries.

The Group provides over 50% of value addition locally by producing its textiles, thread, buttons, and hangers to design and deliver casual bottoms, intimate and activewear, woven and knitted fabrics and a host of apparel industry accessories to brands including Victoria’s Secret, Gap, Next, and Marks and Spencer.



Eco Spindles PVT Ltd (BPPL Group)

Nalaka Senavirathna, Jerome De Mel, and the team.

Eco-Spindles (Private) Limited has a vision of maintaining environmental standards whilst addressing customer expectations, with research and development focused on delivering the highest quality product and conducted via energy-efficient technologies.

The Eco Spindles synthetic yarn production facility is one of the only facilities in Sri Lanka where yarn is produced exclusively from recycled PET flakes. Remarkably, it is also one of two plants globally that creates yarn directly from flakes, circumventing the polymerisation process seen at other plants where flakes are first converted to chips and then to yarn.



Hayleys Fabric Plc

Saliya Thilakarathna, Dunstan Weragala, and the team.

Hayleys Fabric is a pioneer in weft knit fabric manufacture, delivering over 3 million metres of fabric per month, resulting in an annual turnover of USD72 million.

The manufacturing facility at Hayleys Fabric is capable of knitting, dyeing, printing, brushing, sueding, and finishing to produce single jersey, interlock, pique, rib, fleece and polar fleece, jacquard, and flat knits using well-known materials as well as more sustainable innovations that use recycled yarns from PET bottles collected from the shores of Sri Lanka.



Hela Apparel Holdings PLC

Sachith Balage, Akila Palisena, and the team.

Hela Apparel Holdings is a USD270 million company that provides sustainability-focused apparel supply chain solutions. The company works from design to delivery with global brands such as Tommy Hilfiger, Calvin Klein, and Michael Kors in the intimate, sleepwear and children's product ranges.

With ten factories across three countries and a workforce of over 20,000 globally, Hela leads the industry in ethical and sustainable working environments.



Hirdaramani

Yashinth Wijerathne, Chandrakumar Theivendran, Gayan Samarakoon, and the team.

Hirdaramani is a global business with a diversified network spanning 55,000+ associates, six countries and multiple industry sectors, including apparel.

Hirdaramani has qualified practitioners trained in CLO 3D, Browzwear (Vsticher and Lotta) and Optitex, enabling visualisation and virtual development of products before sample creation. Their in-house advanced printing, embroidery, bonding & laser design techniques at their embellishment plants provide integrated apparel design, production and supply chain solutions to premium international brands.



Joint Apparel Association Forum

Kavinda Ratnapala and Yohan Lawrence.

JAAF is the apex body of the apparel industry in Sri Lanka. Our constituent businesses are the Sri Lanka Apparel Exporters Association, the Fabric and Apparel Accessory Manufacturers Association, the Sri Lanka Chamber of Garment Exporters, the Sri Lanka Sourcing Association and the Free Trade Zone Manufacturers Association.



MAS Holdings Limited

Keshini Talwatte, Dhanujie Jayapala, Nemanthie Kooragamage, and the team.

MAS Holdings, the largest apparel tech company in South Asia, is among the most recognised design-to-delivery solution providers in apparel and textile manufacturing. Home to a community of over 100,000 people, today, MAS spans across manufacturing plants in 15 countries, with established design locations placed in key style centres across the world.

Over 30 years of operations, MAS has gained global recognition for its ethical and sustainable working environment and for the organisation's tireless efforts in social development and women's empowerment. Product excellence and craftsmanship have placed MAS on the world map as an industry leader, showcasing unfailing delivery in innovative manufacturing and design.



Ocean Lanka PVT Limited

Anuruddha Weerasekera, Prabakaran Gobalapillai, and the team.

Established in 1996, Ocean Lanka (Pvt) Ltd is one of the largest weft knitted fabric manufacturers in Sri Lanka, with over 20 years of experience in producing high-quality, world-class fabrics for renowned international brands including Victoria Secret, Pink, Lasenza, Next, PVH, Adidas, Columbia Sportswear, Gap, Nike, Intimissimi, M&S, H&M, Levis and Hugo Boss.

The company is a joint venture between Hong Kong-based Fountain Set Holdings, one of the largest circular knitted fabric manufacturers globally, and local apparel giants Hirdaramani Group and Brandix Lanka Limited.



Teejay Group

Siraj Ahamed, Lal Dayananda, Hasangi Wijeratne, Ishara Perera, Edga Melan, Naasif Nasser, Mendaka Hettithanthri, and the team.

The Teejay Group is positioned as one of the premier and leading multinational manufacturers of weft-knitted fabric in Sri Lanka. They have also expanded to encompass lace dyeing, yarn dyeing and synthetic fabric production.

Their R&D in yarn, fibre, dyes, chemicals, fabrics, and processes gives it the flexibility to offer customised solutions, enabling it to grow a portfolio comprising of world-renowned leading retail brands from Europe, USA and Asia, including PVH, Calzedonia, L Brands, Decathlon, Marks & Spencer, Nike, Uniqlo, and LIDL.

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Executive summary

Introduction

This report outlines a strategy for the scalable digital sharing of Environmental, Social, and Governance (ESG) information, from upstream sources through the value chain, to meet the needs of regulators and consumers in export market destinations. This strategy is crucial for exporters in developing markets, particularly across the Asia-Pacific region, to maintain access to markets and global supply chains, including the European Union (EU) and the United States.

The strategy is designed to be user-friendly for small and medium-sized enterprises, and aimed at the maintenance of export market access and the positive development impacts of this trade. It accommodates any level of digital maturity, from a paper ESG credential photographed with a smartphone and uploaded to a website, to machine-to-machine information exchange.

Strategy development process

The strategy and proposed way forward are informed by:

1. Initial framework

Developed by the Asian Development Bank and GS1.

2. Supply chain mapping

Conducted with leading manufacturers in the Sri Lankan textile and apparel industry.

3. Global Data Standards (GDS)

Recent developments enabled scalable information sharing without costly integrations, making it accessible for small and medium-sized enterprises.

4. Prototype piloting

Demonstrated the digital sharing of a Digital Product Passport, based on the likely requirements of EU regulations for digital supply chain information.

5. Data protocol/model development

Apparel and textiles attributes created for the DPP prototype pilot.

6. Technology provider review

Reviews assessed platforms for their value addition and potential integration into the solution architecture.

7. Desk review and consultations

Conducted an in-depth review of globally relevant sustainability and ESG regulations and related standards development.

Based on the insights gained from this work, we present a concrete roadmap for the deployment of a technology-agnostic, scalable solution. We first touch on the challenge the ADB is trying to address, then cover the key findings, before outlining the roadmap forward.

The threat to continued expansion of global trade and poverty reduction

In response to climate change and other ESG and sustainability concerns, governments are implementing regulations that demand greater transparency and accountability in global value chains. Similar expectations are being expressed by investors, securities exchanges, consumers, and other stakeholders, driving large buyers that 'anchor' global supply chains, to demand transparency and credible reporting from their SME suppliers.

Regulations, while essential for progressing sustainability, could become barriers to trade unless efficient mechanisms are found to share and make ESG data easily accessible digitally.

Several points of concern are:

Adoption of International Financial Reporting Standards' (IFRS) sustainability standards

These are closely aligned to the EU Corporate Sustainability Reporting Directive, also being implemented, and are driving mandatory ESG disclosures at the company level in many jurisdictions.

Digital Product Passport in the EU

The EU has mandated the provision of a Digital Product Passport, which creates a digital record of a product's sustainability information throughout its lifecycle. This will add a new layer of trade requirements that businesses must navigate.

Global trade and CO2 emissions

Global trade accounts for 20-30% of total CO2 emissionsⁱ. With 35-40% of global merchandise exports originating from Asiaⁱⁱ, so does a significant share of these emissions.

Impact on development and poverty reduction

Trade is a crucial driver of development and poverty reduction in Asia.ⁱⁱⁱ Any additional trade barriers could slow down this vital engine of economic growth and poverty alleviation.

While the digital sharing of ESG data will become a trade requirement, it also presents a business opportunity. By making ESG data more transparent, value chain participants can better assess their supply chains and reconfigure them towards more sustainable outcomes. This dual approach not only meets regulatory demands but also fosters a more sustainable and equitable global trade system.

Findings and insights

We collaborated with Sri Lankan manufacturers to pilot the GS1 Digital Link standard for sharing ESG supply chain information across the World Wide Web. We also reviewed traceability technology platforms that support the exchange of ESG data, used for meeting the needs of brand owners and regulators.

Pilot findings and insights include:

Digitalised production processes

Manufacturers can track supplier inputs through each processing stage at their plants and match them to product batches digitally.

Proven capability to source ESG DPP information

Manufacturers populated a data model of likely DPP information requirements, although this currently involves manual collation of original data sources.

Importance of textile and final assembly

These manufacturers play a central role in collating upstream supplier data as they purchase inputs. They account for 41% of total greenhouse gas emissions,

and the next upstream tier accounts for a further 22%. They are influential in their capacity as buyers of inputs to facilitate adoption of scalable techniques for digital sharing of ESG credentials.

Manufacturers have significant compliance burdens

Textile and final assembly manufacturers need to manage a plethora of ESG credentials and information formats and enter data into numerous brand and traceability platforms.

The underlying problems are global not local:

Fragmented data

ESG data is often ‘siloe’d across value chains and its management is outside the control of final assembly manufacturers in Sri Lanka, who need to collate the data.

Lack of common standards

Sri Lankan manufacturers manage global supply chains, but unique terminology and varying standards hinder efforts to achieve interoperability.

Costly and risky technology integration

Changes in commercial partners increase the risk and cost of integration for manufacturers. Changes can be driven by external factors like weather impacts or brands making changes to apparel textile mixes outside of a manufacturer’s control.



Traceability technology platforms

There are hundreds, if not thousands, of technology provider platforms that claim to support product traceability from source to market.

Some observations from our online review and discussions with several platforms:

Blockchain ‘hype’ fades

The promise of blockchain as a supply chain panacea has gone. While it is in active use, most providers are now focused on software-as-a-service platforms, supported by Artificial Intelligence (A.I.).

Legal chain of custody approach

Proprietary methods to match supplier purchase orders to final product batches are common. This approach establishes proof-of-chain-of-custody of ESG credentials associated with supplier inputs. This can involve suppliers along a chain entering purchase order details that are matched to batches.

Leading-edge solutions

Platforms using Global Data Standards (GDS) and web-based approaches for ESG and trade data sharing are emerging. This approach eliminates the need for system-to-system integration, by making ESG credentials discoverable from links to product or batch identifiers, either via scanning Quick Response (QR) barcodes or machine-to-machine access e.g. a website update of an ESG credential is automatically updated in another website.

The platforms are digital ‘islands’ that do not connect to one-another. While these proprietary platforms lack interoperability, many vendors are adopting the GS1 Digital Link standard for data sharing with brands and customers. Most recognise the desirability of standardised interoperable and scalable solutions. Adoption by traceability platforms of the proposed approach is a key component of any strategy to rapidly scale a solution to problems of sharing ESG credentials across supply chains.

Roadmap to a global solution

The key assumption of the roadmap is that ESG credentials are distributed across tens of thousands of repositories, making it a ‘Herculean’ task to enable sharing of them through technology integrations. Similarly, ESG disclosure documents are stored in numerous registries and published on thousands of websites. Given this context of this highly distributed information, the solution is to leave the data where it is and use a standardised, technology-agnostic protocol to access it. This approach ensures compatibility with any technology.

Figure 1, illustrates how a protocol can pass ESG credentials through supply chains using the internet, including the ability to share information via the scan of a barcode. This solution does not start from scratch. It builds on the foundational proven work, much of it in the early stages of global deployment.

The key components of the road map are:

1. Adoption of GS1 Digital Link

Used in the Sri Lanka pilot, GS1 Digital Link is now being widely embraced worldwide and is progressing towards becoming an open, global ISO standard.

2. Use of World Wide Web 3 standards

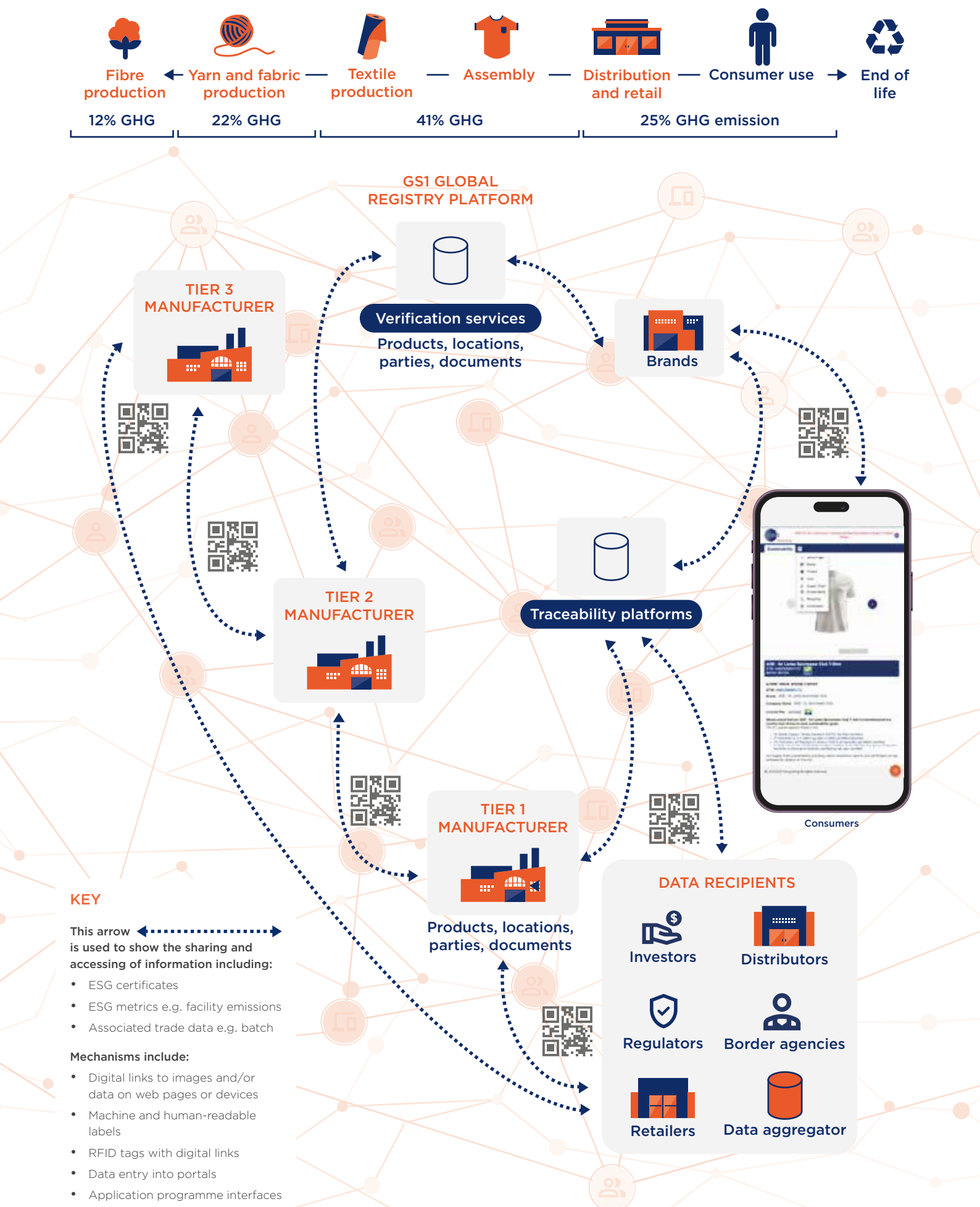
The solution incorporates standards, protocols, and building a consistent web language within the World Wide Web 3 framework. This facilitates access to distributed information, for example, the open Web-vocabulary standard developed to support the deployment of GS1 Digital Link.

"This project, initiated by ADB and facilitated through GS1, is an opportunity for the whole of the Sri Lankan textile and apparel industry to come together and collaborate on advancing the digitising of sustainability performance on a pathway to a more positive global apparel industry.

We were supported by the GS1 team to identify and standardise critical data points, engaging many sustainable certifications in a complex network and making the supply chain ready for the rapidly incoming regulation."

- MAS Holdings Limited

Figure 1: Illustrative web-based digital ecosystem



3. Use of the United Nations Traceability Protocol (UNTP)

Building upon the above initiatives, the UNTP has undergone successful testing of a protocol to share ESG credentials. The UNTP is also developing ESG web vocabulary, including plans for a mapping of ESG credentials to IFRS sustainability topics.

4. Employment of GS1 Registry Platform

The GS1 Registry Platform can be used to verify facility locations and aid in the discovery of manufacturing plant ESG credentials. For example, this platform will enable a link to location-based greenhouse gas emission claims, facilitating the estimation of indirect emissions from intermediate products and their transportation.

5. Development of an ESG Web Schema

Everyday Internet searches benefit from Web Schemas that assist in discovering and organising information for both machines and humans alike. Examples include the structured information consumers are presented after Internet searches for business locations, trading hours, or "movies near me". Sitting behind data presentation are structured taxonomies and millions of businesses following standard formats for placing data on websites.

At the core of this approach lies the use of unique identification, structured data, and common web languages that eliminate the need for bespoke system-to-system integration. This strategy not only streamlines business processes, but also enhances the capabilities of AI learning applications, boosting productivity.

Road map implementation considerations

To effectively implement the foundational elements of the strategy, several key challenges must be addressed.

Prioritisation of strategy development

It is crucial to avoid overcomplicating the process and to focus on developing only the necessary components for a large-scale, scalable, and sustainable pilot. For instance, the emphasis should be on refining ESG credentials specifically for the apparel industry, building on the Digital Product Passport data model and creating a corresponding web vocabulary, before taking on these developments more widely in other sectors.

Formation of a supply chain stakeholder coalition

Establishing a coalition of supply chain stakeholders is essential for the success of a live pilot. This coalition should encompass all entities involved in the supply chain, from source material manufacturers to platform providers and brands placing products in export markets. Collaboration across the entire supply chain is vital for scaling.

Addressing IFRS and Disclosure Frameworks

The absence of a unified global identification schema for IFRS and other disclosure documents poses a challenge, as different jurisdictions follow varying practices. It is important to explore identification solutions to enhance interoperability. Additionally, aligning the structure of IFRS digital "tagging" (used in stock market settings for machine reading of statements) a Web vocabulary development is likely to be important.

Engagement in EU Commission's standards development

The EU Commission has entrusted CENELEC, the EU standards body, with developing standards for the Digital Product Passport. Aligning these standards with international norms provides for compliance with World Trade Organization trade facilitation rules. And to the extent the standards are aligned with those used in disclosures, a robust evidential basis for ESG claims could be referenced. Proactive engagement in this standards development process is important for alignment and harmonisation.

The next step is working with a coalition of stakeholders to give life to the roadmap in a detailed implementation plan that can be used to conduct large live and scalable pilots.



Backstage – aims and regulatory environment

The fashion industry, known for its creativity and innovation, has a significant environmental and social footprint. With increasing awareness of sustainability issues, there is a demand for greater transparency by regulators, investors, and customers.

There are now numerous ESG regulatory measures that Asian-based manufacturers need to comply with to export goods into the EU and US markets. Manufacturers must also comply with brand sustainability auditing and reporting, load data into multiple brand portals, and deploy bespoke digital traceability tools.

We use the term “ESG credentials” to refer to ESG claims that are substantiated, for example, have independent certifications or audited disclosure statements.

This noodle bowl of requirements and business processes is a required but significant compliance burden to maintain market access. Of equal importance are the resource and cost implications and the urgent need to acquire the technical competencies related to ESG and sustainability reporting. Navigating the complex web of supply chain reporting and understanding ESG data is challenging for many companies globally.

The aim of the pilot

The project aimed to investigate how the digital sharing of ESG credentials within value chains could be facilitated, using highly scalable technology approaches.

We investigated how to share ESG credentials and other information sought by regulators. We undertook a pilot using GS1 Digital Link, to assess how, in practice, this new GDS could support the sharing of ESG information. We paid particular attention to how to approach tracking GHG emissions. This is a special ESG credential case, in that knowing the location of supply chain inputs is critical for estimating GHG emissions in trade transportation.

The strategy presented in the report aims to establish an interoperable environment for ESG data sharing, drawing on the lessons from our work with Sri Lankan apparel and other stakeholders.

Our approach

The details of our approach and methodology are set out in **Annex 1**.

The methodology involved several steps:

1. Use of a global multi-disciplinary team of experts
2. Collaboration with interviews with Sri Lanka manufacturers
3. Working in Sri Lanka and regular virtual working group meetings
4. Discussions with brands and technology providers
5. A living lab methodology for the development of a GS1 Digital Link prototype
6. A review of relevant legislation on ESG data requirements and disclosure frameworks.

The engagement and work were spread across a year, involving an iterative process to review and confirm findings.

Context: evolving regulatory regimes

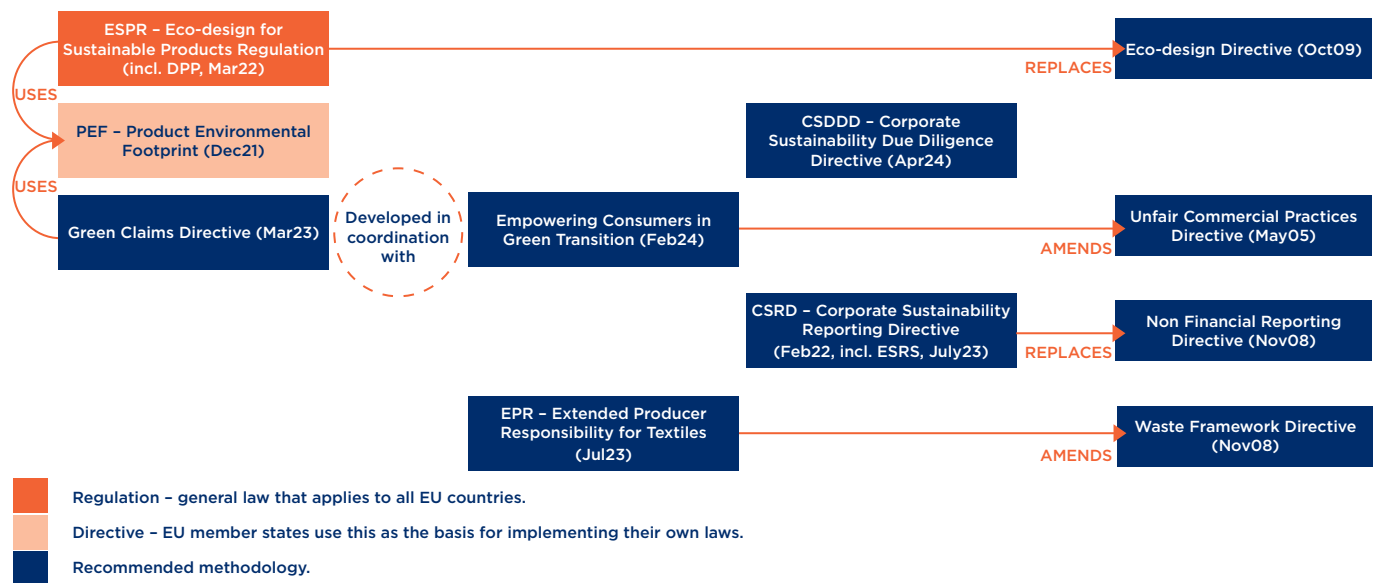
In the EU alone, there are many legislation^{iv} initiatives aimed at reducing the environmental impacts of consumption are progressively coming into force. This proliferation of regulatory demands will reduce environmental footprints across the supply chain and substantiate these with certifications that provide firms with the social licence to operate.

The work to finalise environmental metrics and technical standards for the DPP and other regulations

is ongoing. A complex mix of strategies, plans, as well as work from standards bodies and EU Parliamentary regulations and directives, are involved. **Figure 2** contains directives and regulations that fall within the scope of the EU strategy for sustainable and circular textiles, developed in 2022.

While the implementation of the CSRD, affecting many industries, is underway, other directives affecting textiles are yet to be implemented. They require Delegated Acts or EU Member States to pass laws to adopt. More information on the regulations and directives are in **Annex 2**.

Figure 2: EU Strategy for sustainable and circular textiles



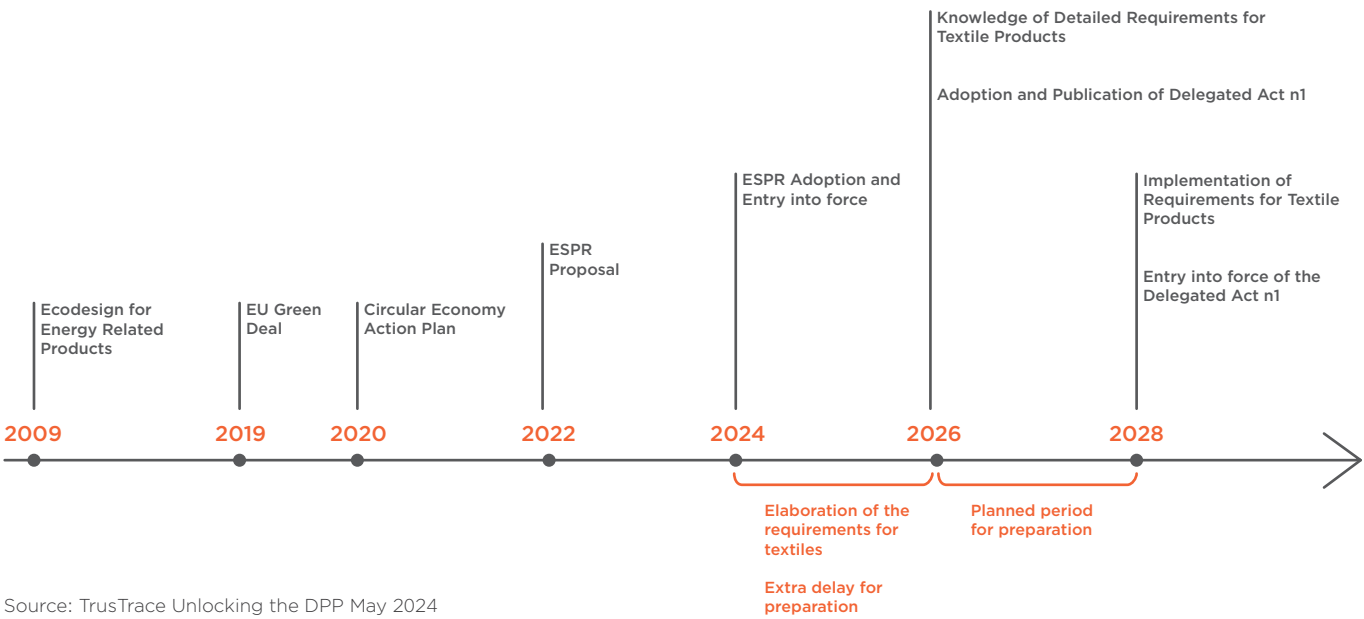
Source: Based on TrusTrace Unlocking the DPP May 2024

Finalisation of DPP environmental and other standards

The EU Commission has referred the further development of technical standards to the EU standard's body, the European Committee for Standardisation (CEN)/CENELEC. A summary of the anticipated timeline for the DPP for textiles is represented in **Figure 3**, with a Delegated Act anticipated in 2026, followed by implementation in 2028.

It is imperative that manufacturers, who will provide the bulk of the ESG data to brands and distributors, ensure that EU regulators understand the challenges of supplying data, before planned implementation in 2028.

Figure 3: Requirements for textile products under the ESPR (to be applied from 2028)



Source: TrusTrace Unlocking the DPP May 2024

ESG disclosure statements

Interoperable with the EU's CSRD is the International Financial Reporting Standards (IFRS) Foundation frameworks for ESG disclosures. Many regulatory jurisdictions around the world are now adopting the IFRS. While these implementations typically focus on large and/or listed companies, they quickly flow onto small and medium-sized enterprises (SMEs) operating within the ecosystem of the larger companies.

Where practicable, sustainability reporting standards should include the metrics required for the DPP. While these disclosures typically operate at an organisational entity level, many metrics, e.g., GHG emissions, can also be expressed at a product level. The E-liability Institute has released (Sept) a draft accounting standard that covers attribution of GHG emissions to products.

The logic supporting their alignment is:

- 1. Audited statements provide evidence**
As audited statements, disclosures may provide the substantiation evidence required by the Green Claims Directive when brands make environmental claims.
- 2. International standards for trade**
As international standards, such as the GHG Protocol, comply with the rules preventing non-tariff trade barriers by WTO members (rules stipulate members should use international standards to avoid non-tariff trade barriers).
- 3. Reduction in compliance burdens**
Greater alignment of standards would reduce burdens on manufacturers.

This approach also supports the needs of manufacturers globally who want to use one consolidated disclosure document to meet multiple trade compliance requirements.



The runway – Sri Lankan global value chain

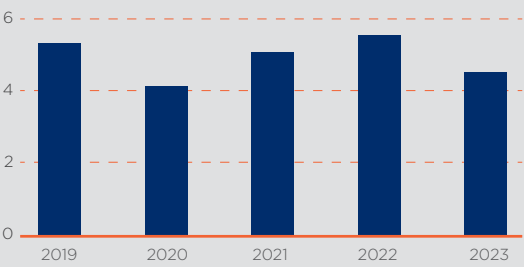
We first provide an overview of the Sri Lankan apparel and textile industry before diving deeply into the global value chains map and then evaluate ESG traceability and data management.

Overview of Sri Lanka

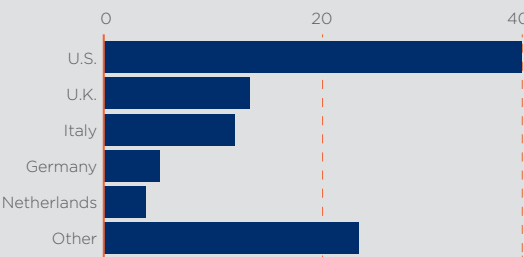
Snapshot: Sri Lanka's apparel and textile industry in 2021

- 6% of Sri Lanka's Gross Domestic Product (GDP)
- 52% of total export earnings
- direct employment for 350,000 people and indirect employment for about 1 million.

Value (in billions of dollars)



Top destinations (in percent)



Source: Sri Lankan Ministry of Industries, Industry Data Book – Apparel and Textile Sector, 2021, source online April 2024

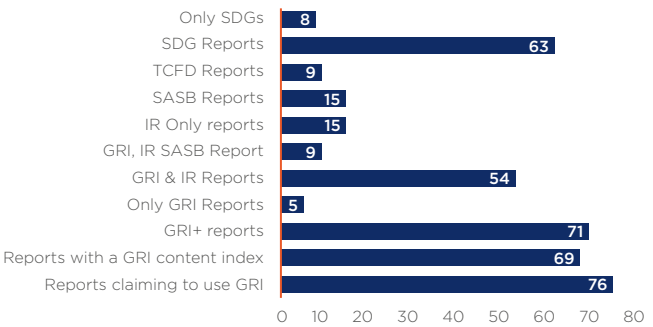
Amid Sri Lanka's lush landscapes, a quiet revolution is stitching together the hopes and dreams of countless individuals. This revolution thrives in the nation's world-renowned textile and garment industry, a cornerstone of Sri Lanka's economy and a beacon of progress for its citizens.

The sector is more than an economic pillar; it is a lifeline, especially for women in semi-urban and rural areas. Beyond low-skill jobs, it offers a significant portion of the workforce stability and prosperity. In bustling factories and serene countryside workshops, women earning wages are gaining independence and empowerment.

In Sri Lanka's economic narrative, the textile and garment industry stands out as a vibrant thread of innovation, resilience, and empowerment. Through its commitment to quality and sustainability, Sri Lanka is weaving a brighter future and setting an example for the world.

Many companies in Sri Lanka actively disclose their environmental impacts as summarised in **Figure 4**, using Global Reporting Initiatives (GRI) and other disclosure standards (SASB & TCFD) that have been incorporated into the IFRS Sustainability Disclosure Standards.

Figure 4: ESG reporting frameworks used by Sri Lankan Companies



Source: Global Reporting Initiative, Sustainability Reporting in Sri Lanka – Connecting the Dots, 2023, p6, sourced online April 2024

Snapshot: Industry Sustainability Credentials

- Over 70 MW of installed rooftop solar power capacity
- 74 Global Organic Textile Standard (GOTS) certified facilities
- 27 factories or 2.3 million sq. feet of LEED-certified factories
- 32% of all 112 factories are WRAP certified (55 Platinum and 57 Gold)
- The highest HIGG FEM (Facility Environmental Module) certification for a textile plant was awarded in 2021 (90%) and 2022 (92%)
- In 2020 (for 2018 and 2019), these apparel factories were the first to have all their facilities net-zero certified globally
- In 2017, they were the first globally to receive the Passive House Factory Building award
- In 2008, they secured the first LEED Platinum certification globally
- In Jan 2020, for the 2019/2018 duration, certified as the World's first group of apparel factories to have all facilities certified as net zero.

Source: JAAF, January 2024

Sri Lankan apparel and textile industry sustainability

Sri Lanka distinguishes itself in the global textile market through its dedication to high-end apparel. Unlike many competitors, Sri Lanka excels in producing sophisticated, high-quality garments for haute couture brands. Required is a complex supply chain capable of supporting the manufacture of items with up to 20 different components, such as a bra, and a highly skilled, innovative workforce adept at handling intricate manufacturing processes.

Meeting these high standards comes with unique challenges. The industry must continually evolve to comply with stringent regulatory standards and the growing demands for ESG compliance from investors and customers. Sustainable practices, fair labour conditions, and minimal environmental impact are not just regulatory requirements but essential for maintaining global consumer trust and satisfaction.

Sri Lanka's textile and garment industry is more than just fabric and fashion; it sets a precedent. It serves as a blueprint for other Asian economies, demonstrating how to balance cost-competitiveness with high-quality production and integrate sophisticated supply chains and skilled labour into economic growth. As Sri Lanka navigates and overcomes its challenges, it offers a sustainable and inclusive industrial development that could accelerate regional trade growth.

A global supply chain map

The textbook view of a linear representation of a supply chain is in **Figure 5** and expanded in the inset. A circular supply chain aims to keep resources in use by designing for reuse, recycling, and regeneration, creating closed-loop systems. This approach reduces the need for virgin resources and minimises waste.

As we transition to a greener economy, supply chains will become even more complex, shifting to circular models focused on repair, reuse, and recycling. Information supporting these processes, sourced primarily from upstream manufacturers, must follow garments downstream to consumers.

This shift towards circular supply chains presents a logistical challenge and an opportunity for a more sustainable industry. By embracing this change, Sri Lanka's textile sector can set a global example, weaving sustainability into its operations.

"Global trade accounts for 20-30% of total CO2 emissions. With 35-40% of global merchandise exports originating from Asia, so does a significant share of these emissions."

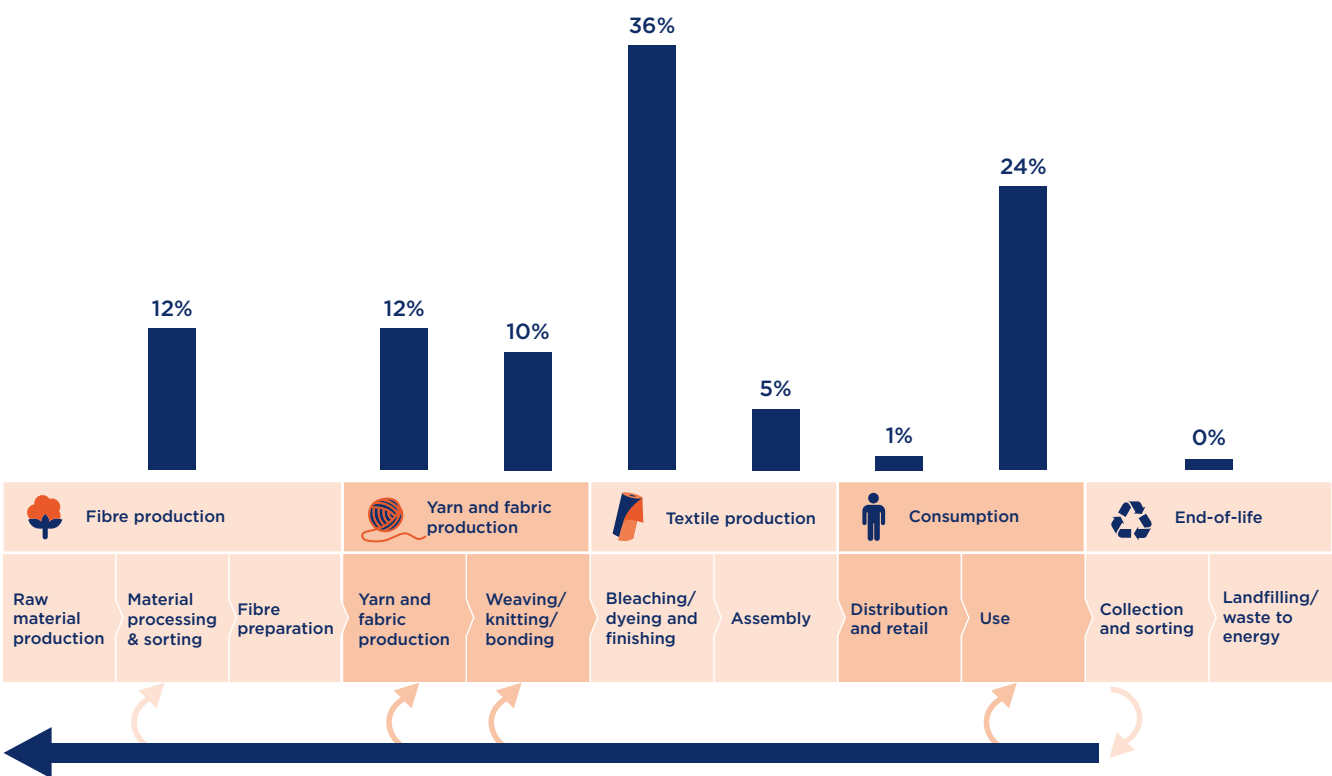
– World Trade Organisation

Figure 5: Simplified supply chain



Source: Based on source WRI and Aii (2021). Roadmap to Net Zero: Delivering Science-Based Targets in the Apparel Sector.

Figure 6: Greenhouse gas emissions across the global apparel value chain



Source: UNEP (2020), Sustainability and Circularity in the Textile Value Chain: Global Stocktaking, p58, sourced online April 2024

Greenhouse gas emissions

Figure 6 extends the simplified supply chain model to represent greenhouse gas emissions along the chain.

The United Nations Environment Programme (UNEP) Textile Value Chain Climate Impact Report reveals that most emissions in the textile industry are upstream: 41% from textile production and 22% from yarn and fabric production. Twenty-five percent of emissions are downstream from consumption. The greatest potential for emission reduction lies in textile production. We mapped value chains with manufacturers to address the likely DPP ESG data requirements and carbon emission disclosures.

Modern supply chains are far more complex and dynamic

The inaugural Supply Chain Maze in Figure 7 details the journey from raw material harvesting to a finished product. This analysis highlights the complexity of Sri Lanka’s textile supply chain and the challenges of collecting and reporting ESG and sustainability data, including carbon emissions.

The green badges seen in Figure 7 in the Supply Chain Maze denote participants who publicly disclose aspects of their environmental footprint, ranging from unsupported claims to certified net-zero carbon emissions. This transparency trend is part of a competitive shift towards a circular economy.

"Accountability and transparency are more demanding factors by these new market segments for the corporates to drive into ethical businesses. In the immediate future, traceability will become a must, especially in the fashion industry. This requires entire supply chain partnerships and collaboration by all associated institutions."

- Teejay Group

Expanding the simplified supply chain

Cotton farming:
Farmers: Grow and harvest cotton plants.

Ginning:
Ginning companies: Separate cotton fibers from seeds and debris, and press the fibers into bales.

Spinning:
Spinning mills: Clean and process cotton bales into threads or yarn.

Weaving or knitting:
Textile mills: Weave or knit yarn into fabric.

Dyeing and finishing:
Dyeing mills: Dye the fabric to the desired color.

Finishing companies: Treat the fabric to achieve certain qualities like softness, durability, or water resistance.

Garment manufacturing:
Clothing manufacturers: Cut and sew the fabric into finished garments.

Quality control:
Quality control specialists: Ensure the finished product meets required standards.

Distribution:
Warehousing: Store the finished garments before they are distributed.

Logistics providers: Transport the garments to various locations.

Wholesale:
Brands/wholesalers/distributors: Purchase garments in bulk to distribute to retailers or sell directly in bulk to large customers.

Retail:
Retailers: Sell the finished garments to consumers through various channels, including brick-and-mortar stores and online platforms.

Marketing and sales:
Marketing agencies: Create advertising campaigns and marketing strategies.

Sales representatives: Introduce and sell the products to retailers or other buyers.

After sale services:
Customer service centres: Handle returns, exchanges, and customer inquiries.

Figure 7: Supply Chain Maze

TIER 0

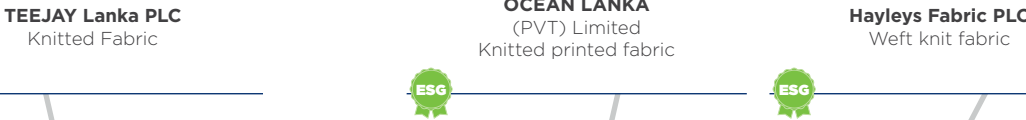
Brands that source from Sri Lanka



TIER 1



TIER 2



TIER 3



TIER 4



TIER 5

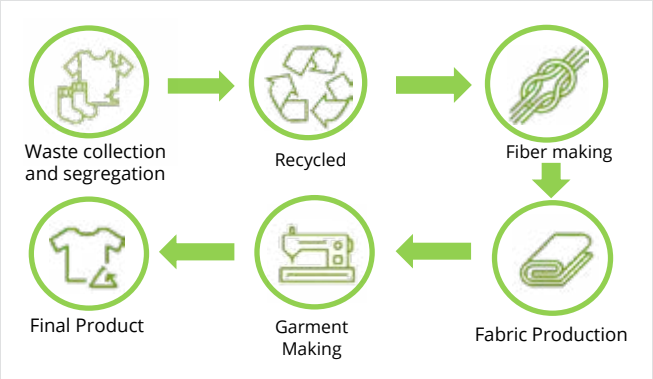


Hela Apparel Holdings (Hela) is supporting the development of recycled cotton and driving further innovations in sustainable textiles.

Hela has supported the development of recycled cotton yarns made from used clothing in partnership with a Sri Lankan textile manufacturer.

Hela has already demonstrated the development of a polyester fabric range made from recycled PET bottles – branded as “RECLAIMED”. Hela has demonstrated the viability of this product by manufacturing thousands of employee uniforms from this fabric.

Recycled cotton process



Source: Hela Apparel Holdings, Information Memorandum, p32, December 2021, sourced online April 2024

Supply chain traceability findings

ESG culture

Today, ESG leadership is a critical competitive advantage for supplying premium global brands and meeting regulatory demands. Manufacturers are integrating ESG elements into their operations and actively reporting carbon emissions. Many supply chain participants in Sri Lanka use various ESG frameworks to disclose their environmental impacts, reflecting their deep commitment to sustainability.

Collaborating with high-end brands requires higher margins and surpassing ESG obligations. Sri Lankan manufacturers, known for adhering to international labour and safety standards, make their garments attractive to brands sourcing ethical products.

Sri Lankan supply chain manufacturers are setting a benchmark in ESG leadership. They are now preparing for new disclosure regimes like the Eco-design for Sustainable Products Regulation (ESPR) and IFRS S2, anticipating streamlined reporting requirements. See the insert example of Brandix ESG reporting on GHG emissions. By prioritising sustainability and ethical practices, Brandix position themselves as preferred partners for global brands committed to responsible sourcing. Sri Lankan manufacturers lead the way in sustainable garment production as they comply with standards globally.

Internal traceability systems

In manufacturing, ESG initiatives align with lean principles like energy efficiency and reducing water use, waste, and carbon emissions. These synergies create financial incentives to capture and track this information using Enterprise Resource Planning (ERP) systems.

In our pilot with these manufacturers, we found that most use Systems Applications and Products (SAP) software, a widely used ERP, to track processes from workstation to workstation, such as fabric cutting to sewing assembly lines.

The pilot revealed other key findings:

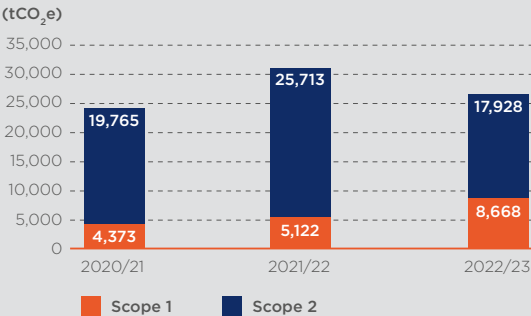
- Advanced digital systems enable manufacturers to track supplier inputs through each processing stage and match them to product batches digitally.
- Manual batch entry is used where electronic tracking is unavailable.

- Tier 1 manufacturers have robust internal batch-level traceability systems and digital processes.

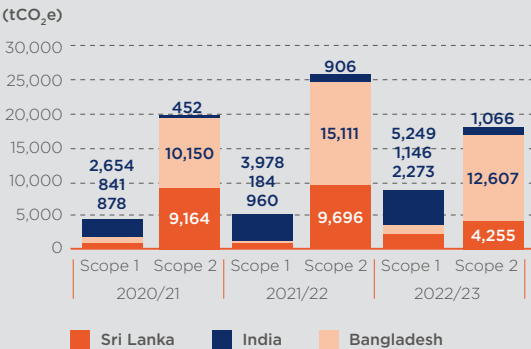
These practices enhance plant productivity whilst strengthening manufacturers’ commitment to sustainability. Integrating ESG data into ERP systems ensures more precise tracking, making manufacturers more agile in production plant management and meeting regulatory demands and market expectations. Positioning them as leaders in sustainable manufacturing, this sets a benchmark for the industry. ESG data supports strategy, decision-making, risk assessment, and mitigation.

Summary of GHG emissions from Brandix, ESG Report 2022/23 – Inspiring Beyond 2024

Group GHG inventory



Countrywise GHG inventory (Scope 1 & 2)



Source: Brandix, ESG Report 2022/23 – Inspiring Beyond, 2024, p 44, sourced online April 2024. Please refer to page 44 of this document for the Data Disclosure that relates to this graph.



ESG data curation and sharing

Tier 1 manufacturers are crucial in meeting the rigorous data requirements of the DPP, which will mandate circular ESG standards. Collaborating closely with manufacturers, we examined their upstream suppliers and mapped their value chains to obtain this critical data. Like many supply chains, the exchange of ESG data is challenging, with each participant relying on the previous one to pass on accurate information down the supply chain.

Manufacturers are pivotal in sourcing, creating, and packaging ESG data and reports for diverse stakeholders. They mostly lack digital integration with upstream suppliers and resort to manual processes to access and share essential data, such as aligning it with shipments. This hurdle underscores the difficulty in achieving seamless digital exchanges across complex supply chains involving numerous independent entities.

Key insights include:

Focus on final assembly

Final assembly manufacturers are central in aggregating upstream supplier data for downstream users, pivotal for scalable digital ESG data sharing.

Mixed systems for ESG sharing

Current data transfer methods vary widely, encompassing paper-based management, emails, web links, spreadsheets, and PDFs, contributing to extensive manual data handling.

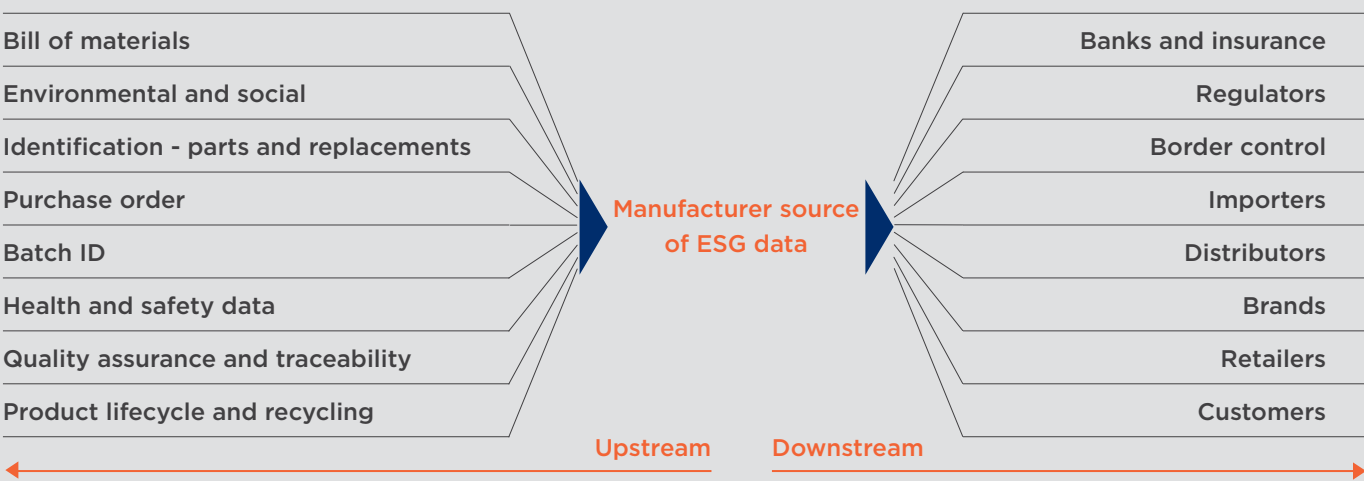
Digital implementation challenges

Significant IT and data management system investments are necessary to digitally source upstream ESG data and synchronise product and batch information for shipment.

Downstream, information sharing involves navigating multiple retail brand portals, resulting in redundant, non-standardised processes. Verification of data accuracy and validity is limited unless participants employ certified technologies like DNA testing for geographic material sourcing. Diverse product types, materials, and company-level certifications further complicate data aggregation.

Manufacturers are the central source of data

Data flows



Wrap up

Globally, the industry stands out for its sustainability achievements, such as being the first globally to achieve net-zero emissions across all its facilities. Despite advancements in internal batch monitoring processes, from fabric inputs to finished products, challenges persist in integrating ESG data across the supply chain. Fragmented data exchange leads to manual processes and discrepancies, jeopardising accurate ESG reporting.

Fielding increasing inquiries about ESG performance, manufacturers share ESG data externally with many parties to drive procurement, marketing, branding, customer engagement, and sales activities. Often included is data entry into non-standardised brand

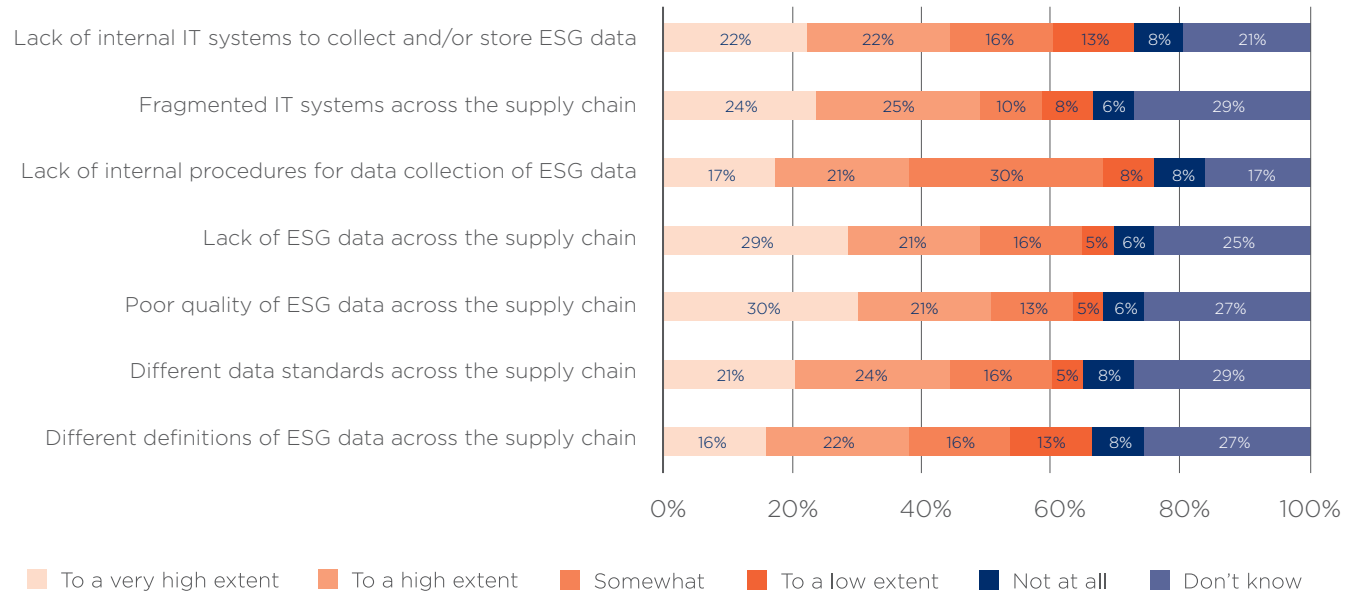
portals and navigating multiple sustainability tracking platforms. Addressing these challenges will empower manufacturers to elevate their ESG data management, paving the way for sustainable practices and establishing benchmarks within the industry.

These challenges are not unique to Sri Lanka. Similar issues in managing ESG data are observed in Danish industries, as highlighted in our case study report.

A Deloitte study (**Figure 8**) shows similar findings for SMEs in the same industry in Denmark.

Figure 8: Technical barriers to collecting ESG data for CSRD corporate sustainability reporting

Question: to what extent are the following technical barriers to collection ESG data to meet the legal requirements of CSRD? Number of respondents: 63. The question was multiple-choice.



Source: Deloitte Global, Circular economy transition in Denmark | Digital Readiness for CSRD of Danish Textile Companies, p17, October 2023, sourced online March 2024 and adapted by GS1 in April 2024

In vogue – standards and technology

Repairing, reusing, and recycling are in vogue. More and more consumers expect to find out with a simple smartphone scan information to support these kinds of activities. We developed a prototype GS1 Digital Link application to evaluate its use in the future capture and sharing of ESG credentials to substantiate ESG claims and provide related supply chain data (e.g., product origin) likely required in a future Digital Product Passport (DPP). The results from testing this prototype provided us with direct insights into the feasibility of sourcing and electronically sharing this information.

GS1 Digital Link standard

GS1's Digital Link is a new standard technology. It enables a 2D QR code to link to multiple online data sources and dynamically update as supply chain data changes. This scalable solution used Global Data Standards (GSD) and World Wide Web protocol standards to share data. GS1 Digital Link is compliant with ISO/IEC 18975. This is a new ISO standard issued in 2024 and GS1 supported its development. It describes methods for combining globally unique identifiers with URLs, thereby facilitating the link between the physical object and its digital information in the Web.^{vi}

Commercial and regulatory adoption is already underway because it:

- is an open-source digital standard, including internet resolver^{vii} and free to download^{viii}
- uses open, standardised, structured data elements
- works at retail point of sale and is 'native' to smartphones
- is dynamic, so the QR code does not require changing when the data is updated.

It is also the QR code with GDSs that GS1 members globally are beginning to implement to replace the linear barcode seen on products today.

Digital Product Passport data model

To evaluate the feasibility of obtaining and sharing ESG data, we used a model of the information attributes likely to be required for DPP. The model aligned with ESPR regulatory provisions that have established the DPP (**Annex 3**).

Our DPP model was informed by:

- research commissioned by the EU Commission's consortium for the Collaborative Initiative for a Standards-based Digital Product Passport for Stakeholder-Specific Sharing of Product Data for a Circular Economy (CIRPASS)^{ix}
- AppTex (Materials Specification Standards) developed by GS1 Hong Kong, the Textile Council (Hong Kong) and supported by the Trade Industry Department (Hong Kong)
- a draft of a data protocol from the Vinnova Project^x.

There was a significant overlap between the GS1 Hong Kong and the Vinnova Project data protocols.

We made further modifications to include audited disclosure statements.

The data protocol includes over 100 textile and apparel industry information attributes, varied according to textile types (e.g., leather or cotton) and other such factors.



Prototype t-shirt ESG data model

The manufacturers prioritised the DPP requirements because they are likely more extensive than other regulatory regimes. Additional foci were the new ESG disclosure regime by the IFRS and carbon disclosures.

We developed an ESG data model (see inset) by putting the required information into a structured format to be exchanged digitally. We added ESG disclosure statements, e.g., carbon disclosures, from ESG reporting frameworks, such as IFRS S2, to the model.

We identified over 50 attributes relevant to the prototype of a white t-shirt in *Annex 3*. Our prototype model was well-aligned with the ESPR (*Annex 4*).

Supply Chain, Product, and Sustainability were some of the headings that we categorised with these attributes. The categories created the basis for a GS1 Digital Link menu in a prototype rendered for smartphones.

It is important to note that a single textile or apparel item will not need all 100+ attributes. As discussed above, the DPP data requirements have a long way to go before finalising standards and regulatory decisions.

"ESG data and framework help in improving good practices and performance. Sharing data with our stakeholders is important to become accountable and transparent. Connecting the digital traceability tool with the Sri Lankan apparel industry is invaluable for us to lead the game."

- Hirdaramani

Data categories for the Prototype demonstrator data model



Brand

Brand Name

ADB – Sri Lanka Sportswear Club

Identifier

GTIN: 04891668001173

BATCH: BAT001

Company Name

ADB – SL Sportswear Club

License Key

4891668

Website

About ADB – Sri Lanka Sportswear Club T-Shirt

Certification

Brand Name

ADB – Sri Lanka Sportswear Club

Identifier

GTIN: 04891668001173

BATCH: BAT001

Apparel Manufacturer

GLN: 89600000000009

WAT-Shirt Manufacturer Ltd, Sri Lanka

- Environmental Protection (EPL)
- Sustainability Higg FSLM
- GRS & OCS Scope Certificate Recycling
- HIGG FACILITY ENVIRONMENTAL
- Brandix-sustainability-report-2021-22
- MAS Sustainability Report

Fabric Manufacturer

GLN: 89000000000009

Cotton Textiles Limited, Sri Lanka

- Blue Sign
- GOTS_ Scope Certificate Fabric
- OEKO-TEXR Certification
- Zero Certificate ZDHC
- GRS & OCS Scope Certificate
- OL Sustainability

Ginner – Cotton Yarn

GLN: 89000000000005

Fibre Textiles Ltd, India

- GOTS-CERTIFICATION
- PFI Report

Care

Identifier

GTIN: 04891668001173

Recommendations

- wash and dry inside out
- machine wash cold, do not use fabric softener,
- gentle cycle, non-chlorine bleach only,
- do not tumble dry, line dry in shade,
- low heat iron, if necessary, do not dry clean.

Best practice



Product

Identifier

GTIN: 04891668001173

Carrier

QRCode

Category

Sportswear

Product type

t-shirt

Colour

White

Style

Crew neck, short sleeve

Size

Medium

Fabric

100% Cotton

Season

Spring Summer 2023

Supply Chain

Identifier

GTIN: 04891668001173

Apparel Manufacturer

WAT-Shirt Manufacturer Ltd, Sri Lanka

GLN: 89600000000009

Fabric Manufacturer

Cotton Textiles Limited, Sri Lanka

GLN: 89000000000009

Ginner – Cotton Fibre

Fibre Textiles Ltd, India

GLN: 89000000000005

Raw Material suppliers – cotton in bales

Wills Cotton Limited, India

GLN: 89000000000005

Sustainability

Identifier

GTIN: 04891668001173

Statement

We are proud that our ADB – Sri Lanka Sportswear Club T-shirt is manufactured in a country that strives to meet sustainability goals.

Supply chain sustainability include carbon emissions reports and certificates:

- Brandix-sustainability-report-2021-22
- MAS Sustainability Report
- Sustainability Higg FSLM

Recycling

Identifier

GTIN: 04891668001173

Recycling statement

Cotton is a highly recyclable material. Bring your old T-shirts to your local recycling station. Help the planet!

Recycling certification

- GRS & OCS Scope Certificate Recycling
- OEKO-TEXR Certification

Insights and lessons

We demonstrated:

- the digital sharing of ESG, product, supply chain, and environmental disclosures in GS1's Digital Link prototype application, accessible via our QR code
- manufacturers could source and assemble the likely DPP data requirements to populate the prototype.

We are not saying this is easy for manufacturers, only that the existing information can be accessed, curated, and managed. But as discussed above, curating and managing this supply chain information is challenging and often manual. To give life to the vision of DPP, simple ways of aggregating, updating, and scaling the sharing of this data are critical for the transition to a circular supply chain model.

Using GS1's Digital Link to pass this data downstream to brand owners, regulators, and consumers streamlines these data exchange processes.

As noted, we based our prototype (see inset of smartphone) menu on our data model. A critical next step will be to engage with the leading apparel industry and regulatory authorities, to gather feedback on whether the ESG data approach is fit-for-purpose for the likely needs of the DPP.

Need for fit-for-purpose ESG user formats

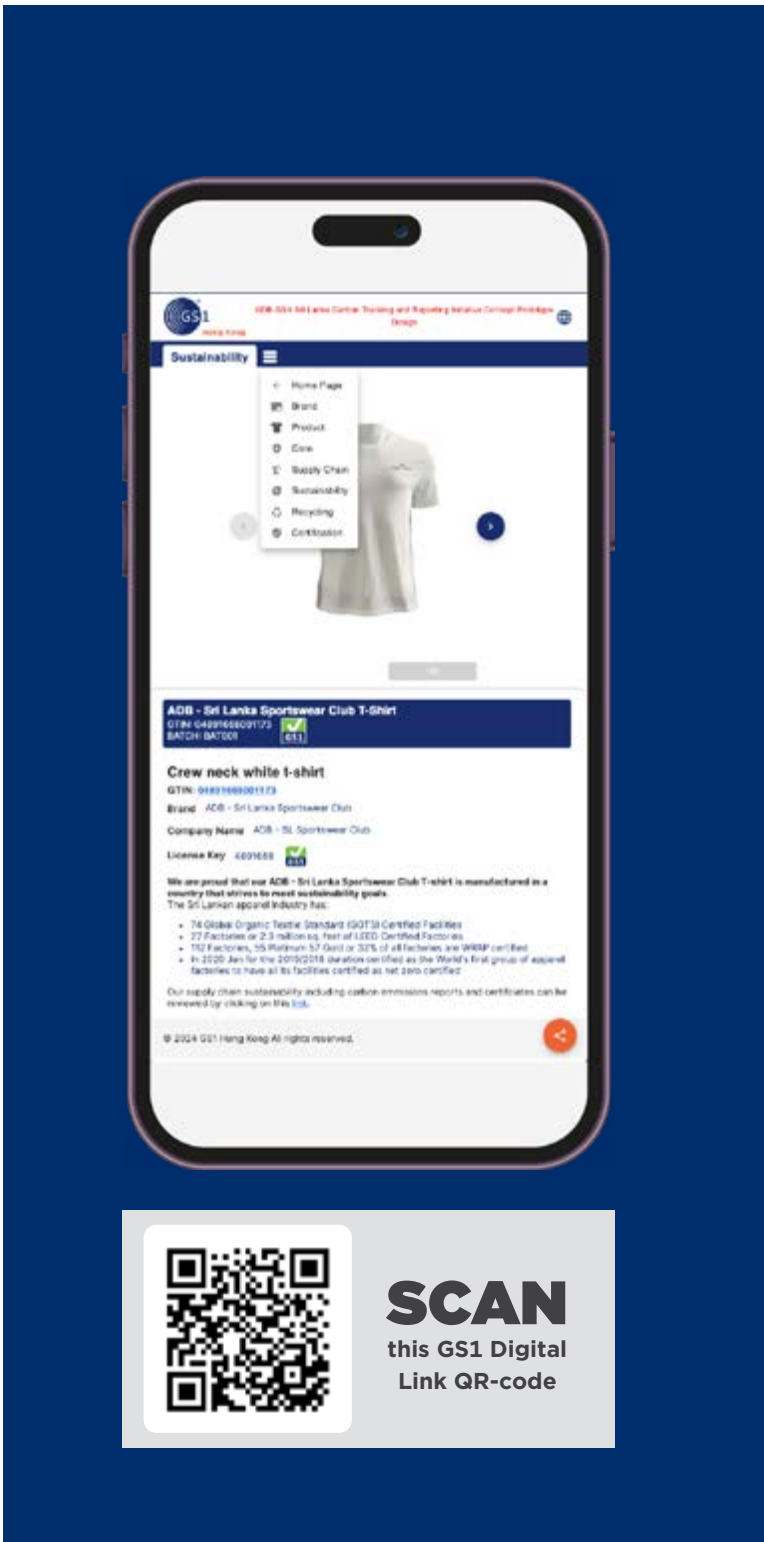
A significant insight came from our inclusion of audited disclosure statements. In an ideal world, manufacturers would make a single audited disclosure document acceptable for multiple purposes, including:

- investment market obligations
- meeting divergent ESG requirements of brands
- covering the requirements of a growing number of regulatory regimes.

There is a high degree of alignment between IFRS and the European Union's ESRS climate related disclosures.

While these disclosure statements may work for many supply chain recipients, such as distributors, retailers, investors, or regulators, they are cumbersome for the average consumer. Only some consumers want a large evidential document; most need simple "headline" information, such as "carbon neutral" with a simple audit or certification reference.

Moving forward, to further develop a digital ESG data ecosystem, we need to evolve (as appropriate) to simple, standardised headline formats that summarise ESG disclosure data. This evolution, in turn, would help simplify carbon tracking, e.g., through sharing data in simple formats for Scope 1, Scope 2, and Scope 3 emission indicators.



Cutting a new pattern – scaling digital sharing

A successful strategy for sharing ESG data in an easy and scalable manner needs to be built on strong standardised foundations. We developed success criteria to evaluate options to improve the sharing of ESG data and paid careful attention to addressing the supply chain challenges we found working with Sri Lankan manufacturers. We begin our discussion on the way forward by looking at the root causes of the problems with sharing supply chain data generally.

Root causes of digital integration problems

The principal cause of value chain interoperability issues is often outside an enterprise's control. Interoperability is due to the fragmentation of data across different silos within the value chain. The root cause is the lack of common standards for accessing and sharing data. This fragmentation includes using different terms for the same items and non-standard (proprietary) data formats, identifiers, and taxonomies. These factors make it laborious to capture, integrate, and share data.

The interoperability problem extends beyond trade, affecting numerous data creators and users outside immediate trade interactions. These include regulatory authorities, data aggregators, researchers, brands, and investors. For example, it is challenging to find and aggregate emissions data across a supply chain to verify the accuracy of statements used in trade. See the global scope of the MAS supply chain in the inset below, which illustrates the geographic scope and complexity of modern supply chains.

Bespoke system-to-system integrations are costly to build and maintain, especially for small enterprises. The dynamic nature of value chains, with partners changing frequently, further exacerbates the risk of such investments. Additionally, where these standards are available, the cost and risk of making temporary system-to-system integrations is another hurdle.

Standardising and making data easily accessible and shareable improves supply chain productivity and benefits many other ESG use cases.



Incorporating lessons from the pilot into the way forward

Several invaluable pilot insights have helped us shape a roadmap for the way forward.

Enhanced visibility through publicly accessible ESG credentials

Manufacturers are now showcasing their ESG credentials on their public-facing websites, providing increased visibility and enabling businesses to evaluate ESG compliance. Our proposed strategy focuses on developing standardised Web Vocabularies and structures to facilitate the seamless digital sharing and discovery of ESG credentials.

Streamlining data sharing

Manufacturers face a significant challenge in inputting data across various portals and specialised traceability platforms. Standardising the format and approach to data sharing can benefit all stakeholders involved. An international collaborative effort is warranted to propel the advancement of an apparel and textile data model.

Precise facility location identification on a global scale

ESG credentials are often specific to sites, emphasising the importance of accurately identifying facility locations and linking ESG credentials to them. This precision is crucial, especially for evaluating and attributing GHG emissions to different supply chain configurations.

Leadership role of tier 1 manufacturers

Tier 1 manufacturers assemble the final product and are predominant aggregators of upstream ESG data, particularly from tiers 2 and 3, which collectively contribute to 53% of GHG emissions.^{xi}

Simplified carbon emission management

With farming accounting for only 12% of total textile apparel emissions, there is no urgency to engage farmers or their representatives for GHG data through traceability platforms. An inferred estimate of 12% for farming eliminates the need to share these GHG emissions, streamlining carbon emission tracking processes.^{xii}

These lessons point to and simplify the path forward for sharing ESG credentials and for tracking carbon.

Success criteria for solutions to improve digital ESG data sharing

We used the following success criteria to develop and evaluate options.

Scalability

Information should be entered or updated once and shared with many parties at minimal incremental cost.

Commercial incentives

Solutions should align with business needs, encouraging companies to keep data up-to-date and share it with others.

Ease of implementation

Adding and sharing ESG data should be embedded into existing business processes.

Extensibility

Solutions should easily adapt to include new ESG credentials as they emerge.

Data discoverability

Data should be easily discoverable, not only by immediate trading partners but also by others, such as potential buyers and investors.

Global adoption potential

Proven solutions should leverage existing global standards processes.

Essential building blocks for an interoperable approach

Applying these criteria allowed us to eliminate options, such as:

- unscalable technology solutions, such as bespoke supply chain integrations and blockchain
- integrating or standardising thousands of ESG repositories.

The success criteria point to solutions that build on GDS combined with the sheer scale and power of the web for data sharing. This approach aligns with recent EU legislation establishing the DPP, which took a standards-based technology approach rather than picking a technology-type winner.



The proposed strategy has the following building blocks.

Application of modern GDS for unambiguous identification

Description

Globally unique identification of parties, facility locations, and ESG credentials.

Objective

To enable ESG data interoperability across repositories, facilitate web discovery, and sharing of ESG credentials.

Implementation

Utilise the GS1 Registry Platform to verify facility locations and support the discovery of ESG credentials. Of note, this will enable links to manufacturing facility GHG emission locations, providing a basis for estimating indirect emissions, such as transport.

Extending ESG and supply chain Web Vocabularies

Description

Web Vocabulary is a set of standardised terms and definitions used to describe data in a specific domain. It provides a common language for interoperable data exchanges online.

Objective

Facilitate seamless data sharing by enabling different systems and platforms to understand and process ESG information without the need for costly system integrations.

Implementation

Collaborate with commercial-grade platforms, manufacturers, and brands to address ESG data-sharing needs. Develop and test ESG vocabularies that address these needs, ensuring practical implementation for scaling the solution.

ESG classification schema

Description

An ESG classification schema is a structured framework that categorises and organises ESG data. This schema helps standardise the presentation of ESG information, making it easier to search, discover, and share.

Objective

Improve web search representation, discoverability, usability, and sharing of ESG credentials for manufacturing facilities and companies globally.

Implementation

Develop a web schema for structured ESG “headline data” that companies can publish using everyday website management tools and test across manufacturing sites, allowing automatic updates to partners and enabling ESG data exchange to help avoid bespoke integrations and solving supply chain interoperability issues.

A standardised approach to apparel DPP data model and protocols

Description

A standardised approach to the DPP data model and protocols involves creating uniform guidelines and standards for how ESG data should be formatted, including associated protocols (e.g., optional versus required data). Implementing this approach ensures that all stakeholders are on the same page and enables greater ease of information exchange.

Objective

Evaluate the likely acceptability to regulators and the feasibility for manufacturers, technology platforms, and brands of providing standardised ESG information likely to meet future DPP requirements.

Implementation

Engaging apparel industry bodies, manufacturers, and other stakeholders in global collaboration to develop standardised data models and protocols for the DPP will ensure the standards are practical and widely accepted.

Leveraging the global GS1 Digital Link implementation

Description

Leveraging the GS1 Digital Link GDS to link ESG credentials to physical products, locations, facilities, or assets.

Objective

Leverage the global opportunity of the GS1 Digital Link QR code, progressively replacing the linear barcode on products worldwide to share ESG data with consumers.

Implementation

Promotion of this DPP-compliant GDS and associated DPP data model protocol, collaborating with industry to create implementation guidelines based on commercial pilots with brands and manufacturers.

There are pros and cons to the recommended approach. While Web Vocabularies enable enhanced interoperability and scalability for seamless data exchange across different systems, they also have challenges. Developing a Web Vocabulary requires mapping existing data structures to the new vocabulary, which is time-consuming. When implementing a new vocabulary, data privacy and security concerns arise, necessitating robust measures to safeguard shared data against breaches and unauthorised access.

Web Vocabularies have been successfully developed and deployed in such diverse domains as e-commerce and developed for international libraries, archives, museums, and other cultural heritage institutions to enhance the management and accessibility of digital information.

GS1 is developing a Web Vocabulary covering many elements of supply chain management. The work of UN/CEFACT is directly relevant to our strategy. The UNTP defines a standard and extensible taxonomy of ESG criteria and provides a mechanism for any standards authority, national regulator, or industry association to map their specific terminology to the UNTP vocabulary.^{xiii} Rather than take on the impossible task of mapping hundreds of ESG standards and regulations globally, the initial step would involve exclusively focusing on the apparel industry and piloting the results with manufacturers and technology solution providers.

A web-based approach supports the use of verifiable credentials, which provide digital means to verify claims. The GS1 Digital Link standard facilitates the linkage of these verifiable claims to products and locations, enabling consumers and businesses to access trustworthy and authenticated information via a simple URL or barcode scan. This enhances transparency, trust, and efficiency in supply chain transactions.



Stakeholder digital ecosystem

The web-based digital ecosystem in **Figure 9** illustrates the potential web-based data flow among stakeholders.

As discussed, supply chains are digitally fragmented, so it's important that the digital ecosystem supports different technology levels of maturity, from paper and PDFs to APIs (machine-to-machine application program interfaces). Digital links can be easily created to share document images like PDFs, bridging the gap between paper and digital. This prevents participants from depending on each other's technology maturity level.

This ecosystem includes the following elements:

1. GS1 Global Registry Platform

This GS1 Registry Platform is an open registry utilised by technology providers, border agencies, retailers, and others for verifying parties, products, documents, and locations. It supports billions of queries and contains identifiers and standardised descriptive metadata used for verification. The GS1 Registry Platform includes a Links Registry, enabling owners of products and facility locations to add digital links to related information, such as ESG certifications for manufacturing facilities.

Digital Sharing Challenges of IFRS Sustainability Disclosures

IFRS sustainability disclosures are progressively being mandated by jurisdictions around the world. The mandates typically affect large publicly listed companies. In some stock market contexts, digital tagging may be required to enable disclosures to be machine readable, enabling investors to compare company financial and sustainability data.

The mandates cascade upstream to smaller businesses, as large corporates require their suppliers to provide them with environmental impact information. It is now common to see environmental disclosure reports on SME websites, whether there to meet the needs of large corporate buyers or to compete for their custom.

How can we support interoperable digital sharing of SME disclosure reports? Most of these documents are PDFs, which are not easily found, or machine read, even when supported by AI applications.

2. Tier 1 manufacturer sourcing and collation of data upstream

As previously discussed, the final assembly manufacturer typically sources and collates ESG certificates. The key in Figure 9 references methods for accessing and sharing the ESG certificates and trade data collated by manufacturers.

3. Data recipients accessing ESG information

Recipients include regulators, distributors, retailers, and other users. Often the data may pass through third parties, such as traceability platforms.

4. The spread of GHG emissions across the value chain

The illustration at the top of Figure 9 shows estimates of GHG emissions across the supply chain. This underlines the importance of final assembly and textile manufacturers for tracking GHG emissions, as they are responsible for 41 percent of emissions.

Traceability Platforms are data recipients and suppliers of ESG information to downstream parties. In an ideal world, the platforms would speak a common language, creating a global network that supports manufacturers, brands, and shared information.

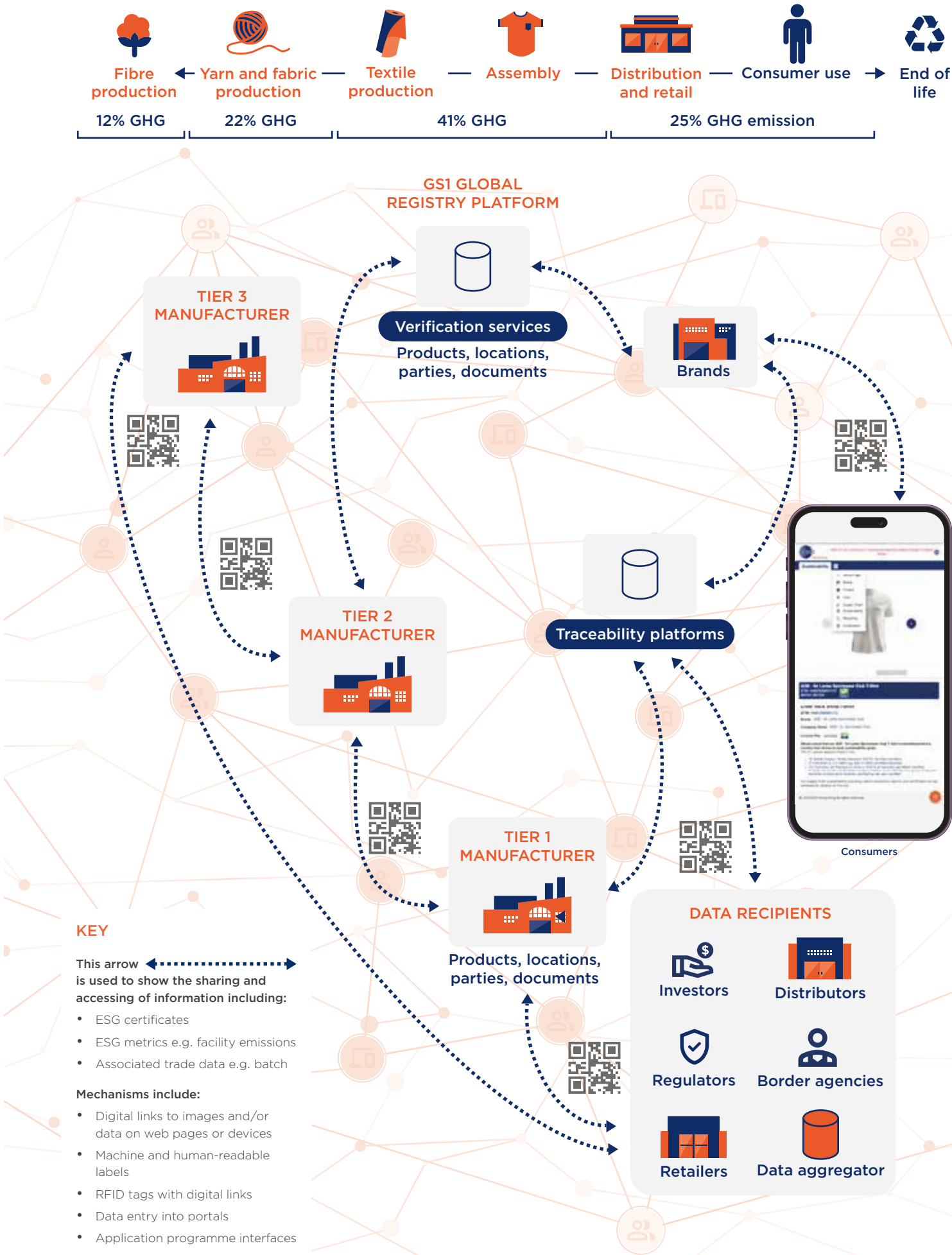
In an ideal world:

- reports would be identified using globally unique identifiers, specifying the report type, location scope, and legal entities involved, which would support interoperability, machine data aggregation, and analysis of environmental impacts across the supply chain
- a Web Vocabulary would identify the form of disclosure and map environmental certifications to disclosure topics, further supporting search engines to find information, interoperability and substantiate claims.

These initiatives would enhance the ability of AI to perform search and analytical functions.

We are far from this ideal outcome for environmental disclosures, although other global endeavours such as e-commerce, libraries, and museums of the world can share data using the above approaches. The digital standards supporting the approaches are not new. What is needed is the development of an implementable strategy aimed at gaining adoption of the standards.

Figure 9: Illustrative web-based digital ecosystem



We reviewed several platform offerings and found there is a wide range of innovative attempts to tackle traceability. Most are deploying GDS to some degree, even if these only use product identifiers. A few are making a substantial effort to deploy sophisticated GDS approaches. Efforts include taking a web-based approach. While still in active use, the promise of blockchain as a supply chain panacea has diminished, and most providers are now focusing on AI-supported SaaS platforms. It is unclear whether blockchain is used as a foundational platform component or serves more limited functions.

A common approach is a legal chain of custody. Platforms receive purchase orders for upstream inputs, match these with batch shipments to market, and use AI to support matching to establish proof of a legal chain of custody.

All platform providers we spoke to want more standardisation to take the pain out of designing bespoke systems. A collaborative approach is needed to coordinate ESG and trade data with international standards (**Annex 5**). To scale and deploy the use of GDS approaches to support seamless data exchanges, the engagement of these private sector platforms is essential.

Moving from a successful pilot to global adoption

Addressing the challenges of digital ESG credential sharing requires a collective effort and collaboration, utilising modern digital standards. Other industries have already proven the technologies necessary for this transformation. For instance, global standards and metadata allow library books to be shared between registries and sold online, while Google can provide consistent search results for movies worldwide.

Transitioning from fragmented digital ESG credential sharing to automated processes necessitates collective action, as no single enterprise can achieve this alone.

Standardisation efforts are often driven by governments, regulatory mandates, or large businesses, e.g., adopting the IFRS sustainability disclosure standards and the EU ESPR (including the DPP) legislation, which incorporates GS1 identity standards.

The adoption pathway includes six key steps:

1. Engage a coalition of stakeholders

Include regulators, industry bodies, manufacturers, brands, and technology providers, before completing successful pilots.

2. Further develop foundational standards

Work to expand web vocabulary schemas with the UN/CEFACT (UNTP framework) for the apparel industry, to support supply chain interoperability.

3. Conduct demonstration pilots with stakeholders

Identify and address necessary standards modifications to meet the supply chain needs.

4. Share results to evaluate wider supply chain adoption needs

Share widely with interested stakeholders and iterate to make improvements with further pilots.

5. Form a GS1 global standard development and management process with the industry

Review and update relevant and issue standards with supply chain participants.

6. Develop and implement capacity-building resources

This involves the rollout of guidelines and toolkits for the textile and apparel industry stakeholders, including technology providers, brands, and manufacturers. This program would be promoted globally through the peak apparel industry bodies and GS1 organizations.

Global adoption of standards can be a lengthy process. It took 30 years for shipping containers, introduced in 1956, to achieve near-universal use. Digital standardisation for ESG credentials is not starting at ground zero. It would follow a well-proven path and with the right collaborative involvement adoption would be relatively rapid. The proposal is to build on existing universal digital standards that support billions of supply chain transactions every day. Moreover, this push towards standardisation will be driven by the need to reduce business costs in response to ESG regulations, demands for responsible investments, and consumer interest in green credentials.



Abbreviations and glossary of terms

Term	Definition
CEN	The European Committee for Standardisation (French: Comité Européen de Normalisation) is a public standards organisation whose mission is to foster the economy of the European Single Market through the maintenance and distribution of coherent sets of standards and specifications.
CENELEC	The European Committee for Electrotechnical Standardisation (French: Comité Européen de Normalisation Électrotechnique) is responsible for European standardisation around electrical engineering. It works closely with the International Electrotechnical Commission (IEC) through the Frankfurt Agreement.
Circular economy	A circular economy involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products for as long as possible.
Conformity credentials	Documentation or certification that demonstrates compliance with specific standards, regulations, or requirements. These credentials serve as evidence that a product, service, process, or system meets the established criteria or conforms to the specified guidelines. Conformity credentials are often issued by authorised bodies or certification agencies after conducting assessments, audits, or tests to verify adherence to the relevant standards.
CSRD	Corporate Sustainability Reporting Directive – the new law in the EU that updated the requirements for which businesses are to report and the sustainability information they report on.
Data model	Definition according to ISO/TS 10303-17: description of the organisation of data in the management information system of an enterprise.
Digitisation	Digitisation is the process of converting information into a digital format.
DPP	The Digital Product Passport is proposed by the European Commission to create a digital record that provides comprehensive information about a product throughout its lifecycle. It is provided for in the EU Ecodesign for Sustainable Products Regulation. It is aimed at making sustainability and circular economy information digitally accessible to supply chain participants, including consumers.
EC	The European Commission (EC) is part of the executive of the European Union (EU).
ERP	Enterprise Resource Planning (ERP) refers to a type of software that businesses use to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations.
ESG	ESG stands for environmental, social, and governance. These are called pillars in ESG frameworks and represent the three main topic areas companies are expected to report on. The goal of ESG is to capture all the non-financial risks and opportunities inherent to a company's day-to-day activities.

Term	Definition
ESG claim	A statement or assertion made by a company or organisation regarding its performance, practices, or policies related to ESG criteria.
ESG credential	An ESG credential is a substantiated claim. It is a certification, qualification, or designation that signifies an individual's or an organisation's expertise, commitment, and adherence to ESG principles and standards. These credentials are typically awarded by recognised institutions, professional bodies, or certification organisations attesting to the claim.
ESG verified credential	A verified ESG credential is an ESG credential that has been authenticated by a trusted authority or entity. This verification process ensures that the credential is legitimate and accurately represents the ESG claim. Verified credentials provide an added layer of trust and reliability compared to unverified credentials.
ESPR	The Ecodesign for Sustainable Products Regulation is a European Community Directive that aims to improve various aspects of products throughout their lifecycle to make them more durable and reliable, easy to reuse, upgrade, repair and recycle, and use less resources, energy, and water.
ESRS	European Sustainability Reporting Standards – the EU's new directive updates the rules concerning the social and environmental information that companies must report.
EU	The European Union is a supranational political and economic union of 27 Member States located primarily in Europe.
Global Data Standards	Global Data Standards refer to internationally recognised open data standards that facilitate consistent and accurate identification, communication, and interoperability across various sectors and industries. Such standards include, but are not limited to, ISO identification standards, SWIFT bank account numbers, vehicle identification and containing shipping numbers, W3C standards supporting internet operations, and open metadata schemes. By adhering to GDS, organisations can support seamless data exchange, enhance operational efficiency, and promote global collaboration.
GS1 Digital Link	A GS1 Digital Link is a standardised way to encode information about products, assets, documents, or locations into a web-friendly format, enabling seamless interaction between physical items and digital information. The GS1 Digital Link standard extends the traditional barcode's functionality, enabling more dynamic and versatile data usage. Companies can use it to embed web links in barcodes, RFID tags, or other product identifiers. These links provide access to rich product information such as product details, pricing, promotions, reviews, and sustainability data. GS1 Digital Link helps improve consumer engagement, supply chain visibility, and interoperability across different platforms and systems.
GS1 GLN	Global Location Number (GLN) can be used by companies to identify their locations, giving them complete flexibility to identify any type or level of location required.
GS1 GTIN	A company can use a Global Trade Item Number (GTIN) to identify each trade item (defined by GS1 as products or services that have been priced, ordered, or invoiced at any point in the supply chain).

Term	Definition
GS1 Resolver	The GS1 Resolver is a global service that translates GS1 ISO compliant identifiers, such as Global Trade Item Numbers (GTINs), Global Location Numbers (GLNs), and other GS1 keys, into actionable information or resources. It acts as a bridge between the physical world of barcodes and the digital world of data, enabling users to access detailed product information, traceability data, and other relevant metadata by scanning a barcode or entering a GS1 identifier.
IFRS	The International Financial Reporting Standards (IFRS) include accounting and sustainability disclosure standards developed by the International Financial Reporting Standards Foundation.
ISO	The International Organization for Standardization (ISO) is an international non-governmental organisation made up of national standards bodies that develops and publishes a wide range of proprietary, industrial, and commercial standards.
ISSB	The International Sustainability Standards Board (ISSB) is an independent, standard-setting body that develops the IFRS Sustainability Disclosure Standards.
JAFF	The Joint Apparel Association Forum is the apex apparel industry body in Sri Lanka.
Legal chain of custody	This involves maintaining records and documentation that demonstrate the authenticity, integrity, and security of products as they move through the supply chain. This is important in industries where there is a need to ensure compliance with regulations, traceability of products, and prevention of fraud or counterfeiting. By establishing a legal chain of custody, companies can demonstrate transparency, accountability, and compliance with legal requirements in their supply chain operations.
Material information	Information is “material” if its disclosure impacts the price of a security or if reasonable investors would want to know the information before making an investment decision.
Peer-to-Peer website information sharing	Peer-to-peer (P2P) sharing of website information involves distributing web content directly between users’ devices rather than relying on a central server. This approach can enhance scalability, reduce server load, and improve content delivery speeds.
PET	PET (polyethylene terephthalate) is a clear, durable, and versatile plastic, which, unlike other plastics, is not single use.
QR code	A Quick Response (QR) code is a type of barcode that can be scanned by a digital device, and that stores information as a series of pixels in a square-shaped grid. QR codes can hold much more information, such as a batch/lot, manufacturing date, serial number, and much more for a host of use cases. 2D barcodes can also include a website address (URL) that opens a webpage for even more product information such as user guides, videos, and safety data sheets, etc.
Supply chain tiers	Supply chain tiers refer to the different levels or stages within a supply chain, each representing a distinct layer of suppliers and their relationships. These tiers help to organise and manage the complexity of the supply chain by categorising suppliers based on their proximity to the final product or service. It is a relative concept as a supplier regarded as a manufacturer’s “tier 1” supplier might be considered by another manufacturer as a “tier 2” supplier.

Term	Definition
Upstream supplier	An upstream supplier is a business from whom you order your materials/supplies to create your products.
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business. It focuses on improving worldwide coordination and cooperation in trade facilitation and electronic business standards. UN/CEFACT develops recommendations and standards to simplify and harmonise international trade procedures and information flows, enhancing global commerce efficiency.
UNTP	The United Nations Transparency Protocol was developed by UN/CEFACT. Its purpose is to support governments and industry with practical measures to counter greenwashing, by implementing supply chain traceability and transparency at a scale to achieve meaningful impacts on global sustainability outcomes.
Verifiable credential	A verifiable credential, as defined by the W3C standards, is a digital document that is cryptographically secure and tamper-evident. It contains a set of claims made by an issuer about a subject, which can be a person, organisation, or thing. These credentials are designed to be easily verifiable by third parties, ensuring the authenticity and integrity of the information without needing to contact the issuer directly. They enable secure and privacy-respecting sharing of information across different systems and platforms.
Web Vocabulary	A Web Vocabulary is a set of terms and definitions used in web development, design, and internet technologies. Web Vocabulary is essential for the functioning of the internet. It provides a common coding language– standardisation – that developers and machines globally understand. The language is used to create, design, and manage websites, and support search engine optimisation and other internet technologies.
Web Schema	A web schema is a kind of structured data vocabulary that is used to mark up web page content in ways recognised by major internet search engine providers. It provides a standardised format for defining the properties and relationships of data on the web, making it easier for search engines to represent website content in a meaningful way to internet users. The hierarchical structure of a web schema includes: - types: these are the categories of items described using schema markup, such as Person, Event, Product, Organisation, Recipe, etc - properties: these are the attributes or characteristics of the types, e.g., a person type might have properties like name, birthdate, and job title - values: these are the actual data points assigned to the properties. For example, if you have a Person type with a name property, the value might be “John Doe”. There are many web schemas used daily by website content managers, including for products (e.g., description and/or price), for finding a movie (e.g., title and director), and for finding businesses (e.g., type, location, and business hours).

Annexes

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Annex 1: Description of the assignment, approach, and methodology

The assignment

The ADB wished to investigate how to achieve digital sharing of ESG information. This investigation supported greater supply chain transparency to maintain market access in a region with growing regulatory requirements. The scope of the work covered:

- undertaking assessments and investigations to guide pilot design for ESG data exchange
- evaluating and advising on a menu of options to accelerate trusted ESG data exchanges
- assessing how the IFRS can gain visibility of relevant certificates and reports that may apply to IFRS S1 and S2 standards (not expressly in Terms of Reference (TOR)).

The project included the development of a prototype for data sharing in textile and apparel supply chains.

Approach and methodology

Our approach included mapping the supply chain and documenting the types of ESG data available, its source, and exchange methods. The data model was used to frame sought-after data types and information, building on work done in the EU by GS1 Sweden with the apparel industry and GS1 Hong Kong’s work with the textile industry in Asia.

The assignment used a multi-disciplinary team approach. The team had a global footprint, drawing on resources from six countries, reflecting the global nature of the supply chains and the distribution of required expertise. The team had the following experience and skills:

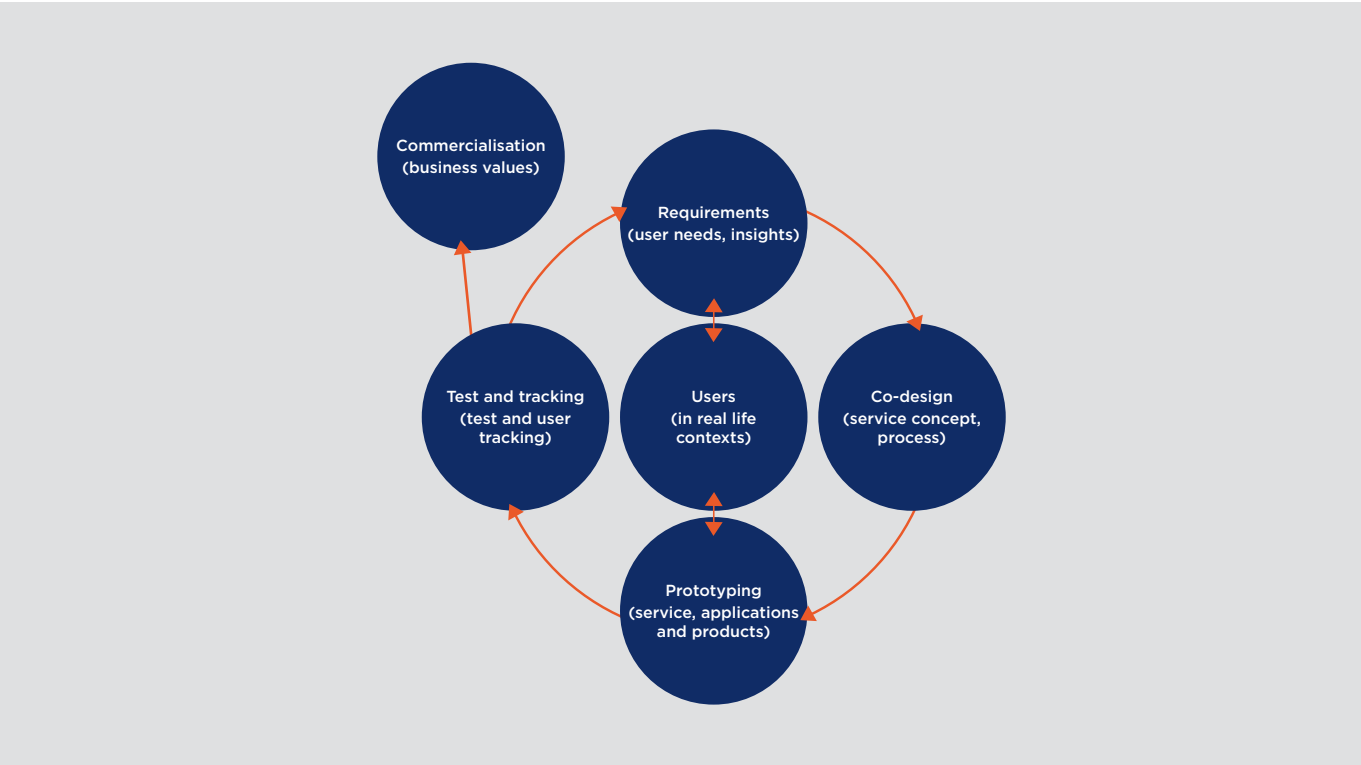
- applying open GDS (inclusive of GS1 standards)
- apparel industry expertise
- supply chain assessments of data flow
- digital prototype development
- technology integration architectures
- public and regulatory policy (priority meeting needs of EU DPP).

Methodology

The work scope required the application of three methodologies:

- A structured open discussion, interviews, and visiting manufacturing plants in-field
- Questions and workshop to scope IFRS needs
- A Living Labs method for engagement with stakeholders and the development of a prototype.

All material milestone outputs were reviewed progressively by external stakeholders.



We used a mixed methods design, in which quantitative and qualitative methods supplement each other, to assess the supply chain, including:

- initial engagement with the Sri Lankan Joint Apparel Association Forum and apparel and textile manufacturers to present the project context and objectives and to gain an understanding of their unique industry context
- identification of eight manufacturers for the pilot visit (core team) and product focus (t-shirt and bra)
- initial presentation of the data model and refinement of language, terminology, and structure with a subset group of manufacturers before presentation to the core team
- preparation of a questionnaire based on the data model
- regular review processes with the industry working group in Sri Lanka.

The Living Labs approach involves iterative engagement with stakeholders to:

- understand requirements
- co-design concepts and services needed
- prototype the service
- test and reconfigure, as required.

Note: the last step shown in the diagram, commercialisation, is not in the scope of this work.

Also note: findings and learnings on the likely DPP requirements and other relevant supply chain regulation, and the IFRS standards served as inputs into the co-design process with manufacturers.

Annex 2: Overview of the relevant legislations and frameworks in the EU

Legislation/framework	Objective	Scope	Requirements
Corporate Sustainability Due Diligence Directive (CSDDD)	Ensure companies conduct human rights and environmental due diligence in their operations and value chains.	The CSDDD applies to large companies and smaller high-risk companies. It also includes those not based in the EU but active in the EU market.	Companies must integrate due diligence into their policies, identify and manage adverse impacts, monitor effectiveness, and publicly report on due diligence efforts.
Corporate Sustainability Reporting Directive (CSRD)	Enhance and standardise companies' sustainability reporting.	The CSRD applies to large companies, listed SMEs, and other public interest entities within the EU.	Companies must report on ESG factors, including sustainability risks, opportunities, policies, targets, and due diligence processes.
Within the CSRD: European Sustainability Reporting Standards (ESRS)	Provide detailed reporting standards under the CSRD to ensure consistent and comparable sustainability information across the EU.	At the time of writing this report, the ESRS applies to all companies subject to the CSRD – large public-interest companies (with over 500 employees) are already subject to the Non-Financial Reporting Directive (NFRD), with reports due in 2025.	Companies establish specific reporting standards covering several ESG topics, ensuring companies provide detailed and comparable information on their sustainability performance and impacts.

Legislation/framework	Objective	Scope	Requirements
Deforestation Regulation	Products sold into the EU do not contribute to global deforestation and forest degradation.	Activities relating to purchasing or trading raw, partly processed, or finished leather for processing.	Operators must ensure that products are: - deforestation-free - not produced on land deforested or degraded after 31 December 2020 - produced according to the laws of the country of production - covered by a due diligence statement.
Eco-design for Sustainable Products Regulation (ESPR)	Make sustainable products the 'norm' in the EU market.	11 product groups ^{xiv} , including textiles (notably garments and footwear), have been prioritised in the 2024-2027 working plan.	Operators set eco-design requirements for specific product groups to significantly improve their circularity, energy performance, and other environmental sustainability aspects.
Within the ESPR: Digital Product Passport (DPP)	Facilitates the transition to a circular economy by providing detailed information about products to all actors in the supply chain, from manufacturers to consumers to recyclers.	The DPP applies to various products, particularly those in circular economy initiatives, including batteries, textiles, and other products.	- Product information: the DPP must include information on the composition, origin, environmental impact, repairability, and recyclability of a product - Digital access: the information must be digitally accessible through a standardised format, such as a QR code or similar technology.
ERP	Enhance sustainability and reduce environmental footprint to promote a circular economy.	Applies to various product categories, including textiles, electronics, and furniture, targeting economic operators who present products to market.	Suppliers of textiles to the EU need to establish a scheme (at their cost) to separate the collection and sorting of textiles for reuse, preparing for reuse, and recycling.
Green Claims Directive	Regulate the substantiation and communication of environmental claims to prevent greenwashing.	This Directive applies to companies making voluntary claims and labelling (not covered by existing EU legislation or EU labels (e.g., Ecolabel)).	Claims must consider the lifecycle of the product, be evidence-based, verified by a third party, transparent, and standardised.

Annex 3: The draft data model t-shirt prototype bolded

Brand information	Supply chain information
Brand Brand Location Brand Contact Details Logo Sub Brand Sub Brand Location Sub Brand Contact Details	Supplier Name Supplier Location Supplier Contact Details Facility Registry Facility Identifier Facility Name Facility Location Operator Registry Operator Identifier
Parent Company Parent Company Location Parent Company Contact Details Trader Trader Location Trader Contact Details Reseller Name Reseller Location Reseller Contact Details	Country of Origin – Confection Country of Origin – Dyeing and Printing Country of Origin – Weaving and Knitting Logistics Units (container, pallet etc.) Transport or Freight forwarding company Owner/operator means of transport Transportation – Conveyance (truck, rail, ship etc) Transportation – Pick-up logistics units Transportation – Batch Transportation – Qty Transportation – Delivering logistics units
Digital identifier Data Carrier / Identifier Type Data Carrier / Identifier Material Data Carrier / Identifier Location Data Carrier / Identifier ISO standard	Care information Care Image Care Text Safety Information

Material information
Component
Material
Content Name
Content Value
Content Value
Content Source
Material Trademarks
Content Name Other
Trim Type
Component Weight Recycled
Recycled Percentage
Recycled Input Source
Renewable
Renewable Percentage
Renewable Input Source
Leather Species
Leather Grade
Leather Species Other
Leather Pattern
Leather Thickness
Leather Max
Leather Min
Sewing Thread Content
Print Ink Type
Dye Class
Dye Class Standard
Finishes
Pattern
Recovery Materials

Material information
Product Identification Systems
Product Identification Value
Unique Product ID
Product Name
Consumer-Facing Description
Photo
Article Number
Item Number
Batch/Lot Number
PO Number
Commodity Code System
Commodity Code Number
Year of Intended Sale (new)
Season of Intended Sale (new)
Price Currency
MSRP
Resale Price
Size
Country Code for Size
Colour (Brand) and Colour (General)
Category Product Group
Type – Line Concept and Type – Item
Age Group
Gender
Market Segment
Water Properties
Final product
Net Weight
Unit of Weight
Packaging Weight

Process identification
Process (Product) Inputs
Process (Product) Outputs
Type of Process
Equipment (Machine)
Process Event Occurrence – Data
Process Event Occurrence – Date/Time
Quality
Characteristics
Inspections
Certifications
Audit reports (Products/Materials)
Health and safety-related information
Unsafe Workplaces and Work Practices
Inadequate Personal Protective Equipment
Compliance information
Harmful Substances
Harmful Substances Info
Certifications
Certifications Validation
Chemical Compliance (Standard)
Chemical Compliance Validation
Chemical Compliance Scan 4 Chem Link
Microplastics
Traceability Provider
Product Passport Service Provider

Circularity information
Performance
Recyclability
Take Back Instructions
Recycling Instructions
Disassembly Instructions Sorters
Disassembly Instructions User
Sort Instructions Sorters
c.f. Circular Design Strategy ^{xv}
c.f. Circular Design Strategy Description ^{xvi}
Repair Instructions
Repairability
Sustainability information
Circular, Sustainable, Social Brand Statement
Circular, Sustainable, Social Brand Statement Link
Quantified Environmental Footprint
Use/consumption of Energy, Water, and Other Resources
Carbon Footprint
Material Footprint
Emissions to Air, Water or Soil
Amounts of Waste Generated
Waste Type

Sustainability information

Circular, Sustainable, Social Brand Statement

Circular, Sustainable, Social Brand Statement Link

Quantified Environmental Footprint

Use/consumption of Energy, Water, and Other Resources

Carbon Footprint

Material Footprint

Emissions to Air, Water or Soil

Amounts of Waste Generated

Waste Type

Human rights and labour-related information

Child Labour

Forced/Compulsory Labour

Trade Unions/Collective Bargaining Rights

Discrimination (Women and Minorities)

Sexual Harassment

Exploitation of Home Workers

Working Conditions:

- Wages
- Working Times
- Contracts (with Workers and/or Subcontractors)
- Temporary Employment

Recruitment Practices

Lack of Social Security

Ethics-related information

Bribery and Corruption

Land Rights/Community Welfare

Animal Welfare

Sustainability certification / inspection reports

Disclosures using: CDP, GHG Protocol, GRI, Higg Index, IFRS S2, SBTi, SDG, TCFD, UN Global Compact

Sustainability Reports

Certificate Type

Certificate ID

Issue and Expiry Dates

Issuing Agency ID (Optional: Name and Address)

Standards Certified/Inspected for

Claim, and if claim is approved or not

Additional Data (may include copy of actual certificate or inspection report)

Annex 4: Product information and technical reference in ESPR DPP

Product and material information

Material component – Recycled, Recycled percentage, Recycled input source, Renewable, Renewable percentage, Renewable input source, Leather species, Leather grade, Leather species other, Dye class, Dye class standard, Recovery materials

Compliance information^{xvii} – Harmful substances, Harmful substances info, Certifications, Certifications validation, Chemical compliance (standard), Chemical compliance validation, Chemical compliance scan 4 chem link, Microplastics

Circularity information^{xviii} – Performance recyclability, Take back instructions, Recycling instructions, Disassembly instructions, Sorters disassembly instructions, User sort instructions, Sorters, c.f Circular design strategy^{xix}, c.f Circular design strategy description^{xx}, Repair instructions, Repairability

Sustainability information – Circular sustainable social brand statement, Circular sustainable social brand statement link

Quantified environmental footprint^{xxi} – Use or consumption of energy^{xxii}, Water and other resources, Carbon footprint^{xxiii}, Material footprint, Emissions to air, water, or soil, Amounts of waste generated, waste type

Product information^{xxiv} – Product name, Supplier name, and Origin.

Technical data standard requirements – of the ESPR DPP associated with products:

All data [...] with an interoperable format [...] shall be [...] machine-readable, structured, searchable, and transferable through an open interoperable data exchange network without vendor lock-in [...]^{xxv}

Supply chain information^{xxvi} – Supplier name, Supplier location, Supplier contact details, Facility registry, Facility identifier^{xxvii}, Facility name, Facility location, Operator registry, Operator identifier^{xxviii}

Digital identifier – Data carrier QR or RFID / identifier type, Data carrier / identifier material, Data carrier / identifier location, Data carrier^{xxix} / identifier ISO / IEC standard 15459 (applied by GS1 for identification of product and locations).

Annex 5: Sample of traceability platforms

Solution provider	Traceability offerings
Atma	Avery Dennison provides unique digital IDs for everyday items, from source passed to consumer, to enable circularity.
Digimarc	Companies can gain automated, item-level insights about their products’ status, origin, and location, as well as deter digital counterfeiting with its pioneering digital watermarking.
Fluxy.one	Fluxy.one is an easy-to-use DPP and GS1 code management service for SMEs, manufacturers, and e-commerce organisations advancing sustainability and circular economy principles.
GoodsTag	GoodsTag’s Smart Products Platform as a Service facilitates the sustainable implementation of DPPs and circularity ecosystems with unique IDs, enabling manufacturers and retailers to provide dynamic content on physical products.
itmatters	itmatters uses AI on the Ethereum blockchain to automatically collect and organise internal and external organisational product data – from raw materials, and ingredients, to finished products, packaging, production and distribution data, all the way through to purchase, resell, or recycle information.
TextileGenesis™	As a blockchain SaaS platform, TextileGenesis™ engages 1,500 suppliers across 50 brands and all 5-6 tiers of the apparel supply chain to digitise premium and sustainable textiles and provide item-level traceability by using rule-based AI augmented intelligence.
TrackVision AI	TrackVision AI is a cost-efficient, scalable, fast, and secure SaaS platform that runs on any public or private cloud to capture and share supply chain traceability data using GS1 EPCIS 2.0 and Digital Link standards.
TrusTrace	TrusTrace is a comprehensive traceability and compliance data management platform that automates the collection and validation of real-time granular data of 45+ brands directly from suppliers who manufacture the products.
Qliktag	Qliktag’s platform enables you to configure a GS1 Digital Link for any “Entity” you choose to manage within the platform. Whether for your product SKUs, pallets, containers, batches/LOTs or down to a serial item, the Digital Link Configuration tool will allow you to set GS1 Digital Link with your domains, item codes, and content that you would like the codes to resolve to, whether you create them within the Qliktag Platform or choose to redirect to external URLs.

Endnotes

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iv Euratex, March 2024, Facts and Key Figures 2024, p4, sourced 26 June 2024 from <https://euratex.eu/wp-content/uploads/EURATEX-Facts-Key-Figures-2024.pdf>

v UNEP, 2023, Sustainability and Circularity in the Textile Value Chain: A Global Roadmap, sourced 9 April 2024 from https://circulareconomy.europa.eu/platform/sites/default/files/2023-12/Full%20Report%20-%20UNEP%20Sustainability%20and%20Circularity%20in%20the%20Textile%20Value%20Chain%20A%20Global%20Roadmap_0.pdf

vi ISO/IEC DIS 23395 is pending approval.

vii The GS1 Resolver is designed to make it easier for businesses to share information about their products and services on the internet.

The GS1 Resolver works by linking GS1 identifiers (like barcodes) to online information about a product or service. When a GS1 identifier is scanned or entered into a system, the GS1 Resolver can provide a URL that leads to more information about that product or service. This can be particularly useful in supply chain management, where quick access to accurate product information can be crucial.

viii GS1, 19 June 2024, Digital Link Docs, sourced 24 June 2024 from <https://github.com/gs1/DigitalLinkDocs>

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xiii United Nations, Sustainability Vocabulary Catalog, sourced 25 June 2024 from <https://uncefact.github.io/spec-untfp/docs/specification/SustainabilityVocabularyCatalog/#un-esg-topic-map>

xiv European Union, February 2024, Cross-sector and sector-specific DPP roadmaps (report – version 1.1), p17, sourced online 3 April 2024 from https://cirpassproject.eu/wp-content/uploads/2024/03/CIRPASS_Cross-sector_and_sector-specific_DPP_roadmaps_1.1.pdf

xv c.f. stands for circular fashion and the data are based on their standard lists.

xvi c.f. stands for circular fashion and the data are based on their standard lists.

xvii European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #25, and Article 7, sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>; and European Parliament, 8th Environmental Action Programme, Article 3 (k)-(l), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022D0591>

xviii European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, Annex I, sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xix c.f. stands for circular fashion and the data are based on their standard lists.

xx c.f. stands for circular fashion and the data are based on their standard lists.

xxi European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #23; Article 2, Article 5(1) (m), Article 5(4b)(iii), Article 7, (1a)(b)(i), and Annex I(l) sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>; and Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations (OJ L 471, 15.12.2021), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H2279>

xxii European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #64, Article 2(4), and Article 4(c), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxiii European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #19, #23, #86, Article 2(25), and Annex I(m), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxiv European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #29, Article 8(3)(a), and Annex V, sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxv European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #28, #30, and Article 9(d), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxvi European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #61, Article 2(10), Article 2(45), and Article 31a, sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxvii European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #33, Article 11, Article 12, and Annex III(l), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxviii European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #32, Article 11, Article 12, Annex III(g), and Annex III(j), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>

xxix European Parliament, Ecodesign for Sustainable Products Regulation, 30 March 2022, #23, #28, #30, #31, Article 7(6), Article 8(2)(c), Article 9(a-c), Article 9(3), and Annex III(l), sourced 31 May 2024 from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0142>



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