



Lifting THE Rug

How **Traceability** in
Textiles Improves Financial
and Sustainability Performance



Key Takeaways	3
Executive Summary	4
Questions for Brand and Retailer Management	6
Textiles Supply chain	7
Why is traceability important?	8
What is traceability?	10
Traceability and transparency are the launch pads for sustainability	12
Regulation is coming	13
Improving supply chain traceability (and transparency) can improve financial performance	14
Despite these upsides, lack of traceability is an issue in the textiles sector	16
What Does traceability look like?	17
Technological developments have shifted the balance between cost and value	19
Raw materials are well certified	21
Traceability is gaining traction through major significant partnerships in major fashion retail companies	22
Work still needs to be done on the transparency of this data	24
Traceability case study	25
Introducing Segura	
What are the next steps for traceability?	31
Call to action	32
For Investors	32
For Brands and retailers	32
Appendix	33
Disclaimer	36
References	37



Key Takeaways

This report has three takeaways:

1

Investors should not tolerate a lack of traceability - for sustainable, regulatory and economic reasons. Indeed, regulation is making traceability an inevitable requirement, with the EU leading the way. Investors should demand full traceability from companies as part of their fiduciary duties.

2

Focusing on the costs of traceability systems misses the profit enhancement it delivers (net profit enhancement of 3-7%), as well as environmental, social and risk mitigation benefits.

3

The tools for companies to have full traceability through their supply chain exist - 'it's not possible' is no longer a valid excuse. No company should be able to promote its sustainability credentials without proof of full traceability - which may involve some transparency measures.



NO COMPANY should be able to
promote its **SUSTAINABILITY** credentials
without **PROOF** of full **TRACEABILITY**



Executive Summary

Companies are coming under more and more pressure from investors, consumers and regulators to be accountable for their supply chains, map them fully across every part of production and have a deep understanding of potential adverse environmental and social impacts throughout their supply chains.ⁱ

Regulation such as the EU strategy for sustainable and circular textiles,ⁱⁱ the proposal for an EU Directive on corporate sustainability due diligenceⁱⁱⁱ and New York's proposed Fashion Sustainability and Social Accountability Act,^{iv} have further implications that mean brands will need to have a fuller understanding of their supply chain, while the looming implications of Scope 3 reporting have particular importance for retail companies (around 90% of Scope 3 emissions for retail companies come from their supply chain).

Suddenly what was seen as a nice to have is fast emerging as a must have for all sorts of stakeholders.

This report will show that:

1

Traceability and sustainability go hand in hand. Better traceability allows for better measurement of inputs and outputs, both vital to support the measurement of key sustainability metrics.

2

Implementation of traceability tools can improve production efficiencies and therefore profitability. There are other benefits too. We estimate implementation of a traceability system could improve the industry's (defined as brands and retailers) net margin of around USD 80 billion by USD 3 - 6 billion per year.

2

Traceability is a non-negotiable for investors. The tools for companies to have full traceability through their supply chain exist, therefore any lack of disclosure is wilful.

While the arguments against better traceability are that it is too difficult and expensive, Segura, a digital supply chain company, has calculated that the introduction of a robust traceability system can improve net profit on average by 3-7% for apparel companies - more than offsetting the cost of implementing the system. In addition, good traceability systems can identify previously unknown inefficiencies (such as extra fabric ordering, consolidation of suppliers and bulk buying and reduction in late component deliveries).

Not only is there a net financial benefit from implementing these measures but it comes hand in

The introduction of a robust **TRACEABILITY**
system can **IMPROVE** net **PROFIT** on average
by **3-7%** for **APPAREL** companies



hand with the ability to better measure and improve environmental impacts, allowing companies to benefit from better sustainability metrics. Environmental impacts must first be measured in order to be improved. Good traceability is a necessary condition for enabling this.

Planet Tracker therefore calls upon investors to continue to pressure brands and retailers for full traceability and transparency. Acceptance of the traditional responses (such as it is too "difficult" or time consuming) can be rebutted with the details in this report, such as improvements in technology and the fact that regulation is inevitable.

This report discusses the range of traceability tools available for textiles companies, focusing specifically on the post-raw materials part of the supply chain - particularly fibre, fabric and garment production.





Questions for brand and retailer management

1 How much visibility do you have over your supply chain?

- a As a percentage, how many of your Tier 1 manufacturers do you have good data for, how many of Tier 2, 3 & 4?
- b What percentage of your products by revenue do you have a full understanding of in your supply chain (down to raw materials)?
- c Where are the gaps you are actively working to plug in your supply chain visibility?

2 How transparent are you with this data?

- a How transparent are you with this data?
- b Is there an economic reason you are not fully transparent with this data? Do you have proof to back up this reasoning?

3 What technologies do you utilise to map your products through the supply chain?

- a Do you use an external traceability provider? If so which one?
- b What financial benefits have you realized by employing this traceability system? What are the downsides to traceability?
- c Can you talk about how your traceability system has allowed you to measure the environmental impact of your supply chain?

4 What pushback have you received from suppliers?

- a What percentage of suppliers are slow to respond? Does that ring alarm bells?

5 What are your future traceability and transparency ambitions?



Textiles supply chain

The Textiles supply chain comprises a group of nodes - see Figure 1. Planet Tracker's Textiles programme focuses on the nature-based risks and opportunities at each node of the supply chain, enabling us to take a more systems-based view of the whole supply chain. This report focuses on traceability throughout the whole supply chain, with the challenges particularly focused in the upstream nodes (e.g. extrusion, spinning, wet processing and dyeing).



Figure 1: Textiles Supply Chain. Source: Planet Tracker.

Why is traceability important?

Traceability has become a priority to textiles and apparel companies as they endeavour to ensure and (through transparency) prove their sustainable practices to the market. The benefits don't just stop with identifying environmental impacts. Better traceability practices can improve the management of supply chains, combat counterfeits, reduce reputational risks and importantly also address social impacts such as human rights violations.

When companies' problems are exposed through a lack of traceability and transparency, the markets do react and the financial and reputational risks of not having this supply chain visibility can be severe and have been well documented.

In July 2020, Boohoo lost GBP 1 billion (USD 1.35 billion) (23%) of value in one day after reports of "modern slavery" when an undercover journalist revealed its clothes were being made in a UK-based factory where workers were being paid below minimum wage.^{v,vi} Boohoo's tribulations didn't end there, as it has continued its weak share price performance (its share price fell by 69%¹ between September 2021 and April 2022, underperforming relative to the indices) - see Figure 2. According to the company, this is attributed to weak sales against forecasts, supply chain issues deflating profit margins and labour issues.

**Boohoo lost 23% of value in ONE DAY
after reports of "MODERN SLAVERY"**

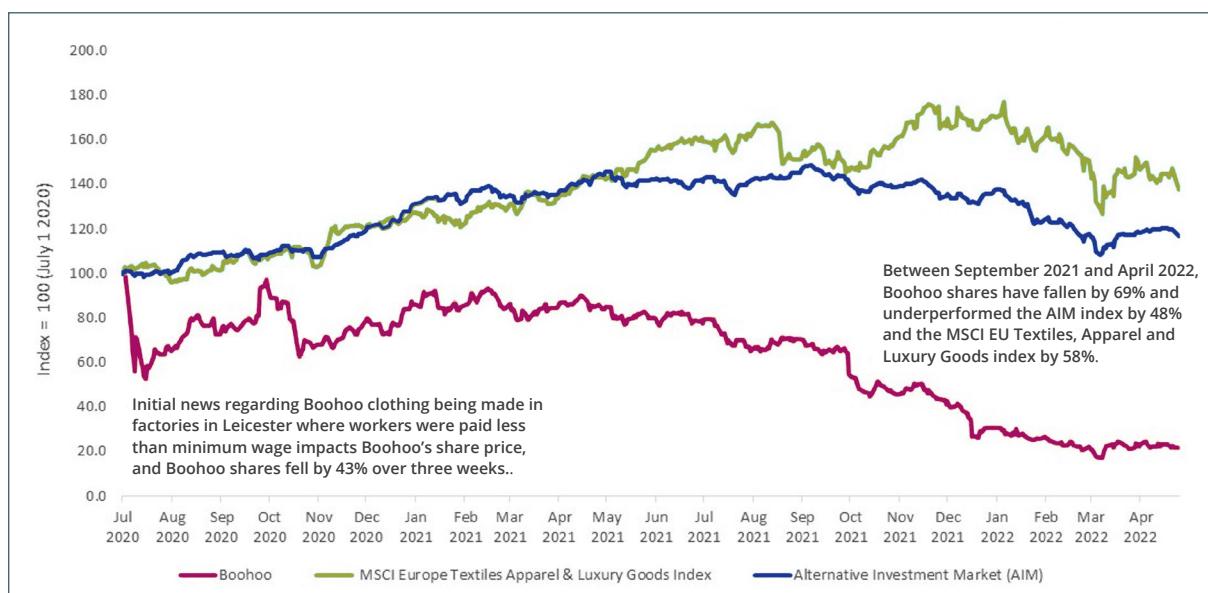


Figure 2: Boohoo Share Price Performance vs Alternative Investment Market (AIM) Index and the MSCI EU Textiles, Apparel and Luxury Goods Index since September 2021. Source: Bloomberg, Planet Tracker.

¹ Calculated as share price fall from £2.81 on September 1, 2021, to £0.88 on April 25, 2022.



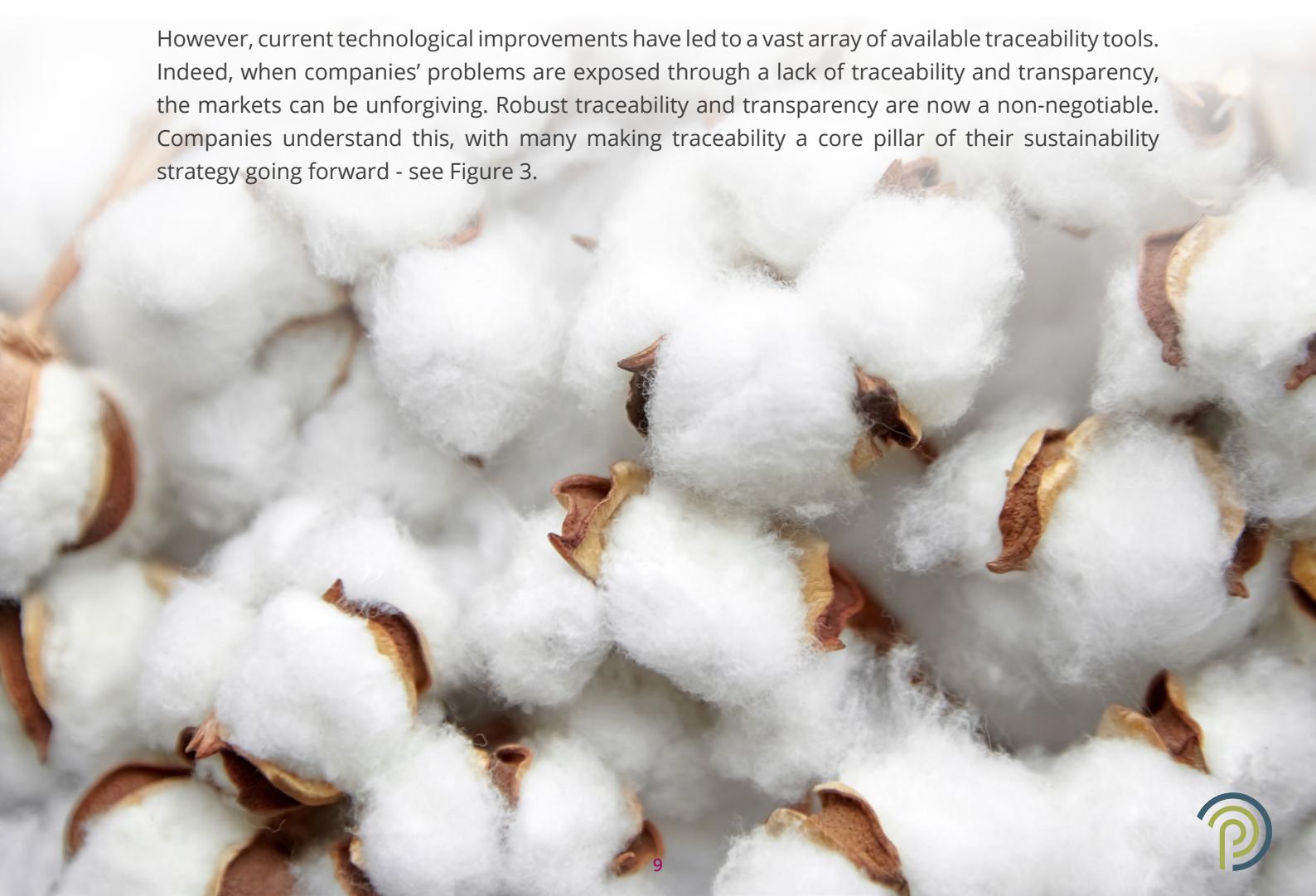
Meanwhile, two separate reports released in December 2020^{vii} and March 2021^{viii} by Newlines Institute for Strategy and Policy first revealed the link between forced labour in Western China and cotton picking and, more damningly, further human rights and forced labour allegations in the Xinjiang region - which accounts for 85% of China's cotton production.^{ix} While China denies the accusations, the reports resulted in sanctions from a number of countries. Brands were caught up in the controversy. H&M^x and Nike^{xi} had actually stopped sourcing cotton from Xinjiang when the Better Cotton Initiative (BCI) stopped certifying raw materials from the region in 2020, but these statements resulted in them facing a backlash from Chinese shoppers, with consumers boycotting them, products being pulled from Chinese owned e-commerce sites and physical stores closing.

It is interesting that despite some brands committing to responsible supply chains, they actually felt the financial and reputational risk the other way. It is also likely that Xinjiang cotton remains in the supply chain. Cotton production from the Xinjiang regions has stayed at the same level as previous years and, despite some countries saying they no longer import cotton goods from the Uyghur region, reports have found that cotton and cotton products are likely still being imported via intermediary countries such as Vietnam, Bangladesh and the Philippines which are not sanctioning the Xinjiang region.^{xii} Please see Planet Tracker's [The politics of Nature Dependent Trade](#).

These issues are not just limited to textiles and apparel. Food has also suffered from similar scandals, with some of the most infamous being the horsemeat scandal of 2013, when horse DNA was found in beef burgers sold in UK supermarkets (up to 29% relative to beef in one case^{xiii}), and the mislabelling of fish which continues to show cheaper fish such as catfish commonly being passed off as more expensive varieties such as cod.^{xiv}

The benefits of good traceability and transparency practices are understood. In the past, traceability has been difficult for companies to implement across the whole supply chain.

However, current technological improvements have led to a vast array of available traceability tools. Indeed, when companies' problems are exposed through a lack of traceability and transparency, the markets can be unforgiving. Robust traceability and transparency are now a non-negotiable. Companies understand this, with many making traceability a core pillar of their sustainability strategy going forward - see Figure 3.



"In order to guarantee accurate traceability, [LVMH] must demonstrate in-depth understanding of all its supply chains, from end to end. Without this understanding, it would be almost impossible to ensure responsible practices."

LVMH Social and Environmental Sustainability Report 2020

"Traceability is one of the crucial challenges to overcome in fashion's complex global supply chains. Indirect sourcing is often routine practice, and the traditional business model set-up requires many sub-suppliers. However, this is not always transparent, making it near impossible to find a material's true origin. As is often the case when it comes to creativity, one of the solutions we've worked on came from an unexpected area: forensic science. This puts Kering one step closer to our 2025 goal of 100% traceability for our key materials."

Kering, Sustainability Progress Report 2017-2020

"H&M Group believe that supply chain traceability and transparency should go hand-in-hand to create greater accountability for where materials and products come from, and to drive positive change in the fashion industry.

Across the fashion industry, brands are testing and implementing lots of exciting technologies such as fingerprint technologies, DNA testing and other raw material tracers. But supply chains are complex and seldom static, and one-time mapping is not enough. We believe that combining new technology with online shared-industry databases can drastically increase supply chain traceability and at H&M Group we are committed to developing our work in this area."

H&M Group website 2022

"Inditex manages the traceability of its supply chain via two main lines of action: its traceability management system and the traceability assessment."

Inditex 2020 Annual report

Figure 3: Recent statements regarding traceability. Source: Company reports.

WHAT IS TRACEABILITY?

Traceability has become a minimum standard for textiles and apparel companies to mitigate supply chain risk. Better traceability practices can combat counterfeits, reduce reputational risks and importantly also address social impacts such as human rights violations.

Alongside these, better traceability is an integral component in achieving better measurability and management of inputs and outputs, leading to a reduced environmental footprint and alongside this, a financial benefit from reduced operational costs and reduced risks, also leading to lower risk-based costs such as for insurance and interest.

The International Organization for Standardization (ISO) provides the most widely recognised definition of supply chain traceability: "*the ability to trace the history, application and location of that which is under consideration, and for products this can include the origin of materials and parts, the processing history and the distribution and location of the product after delivery*".^{xx} ISO further details that traceability encompasses "not only the principal requirement to be able to physically trace products through the distribution chain, from origin to destination and vice versa, but also to be able to provide information on what they are made of and what has happened to them".

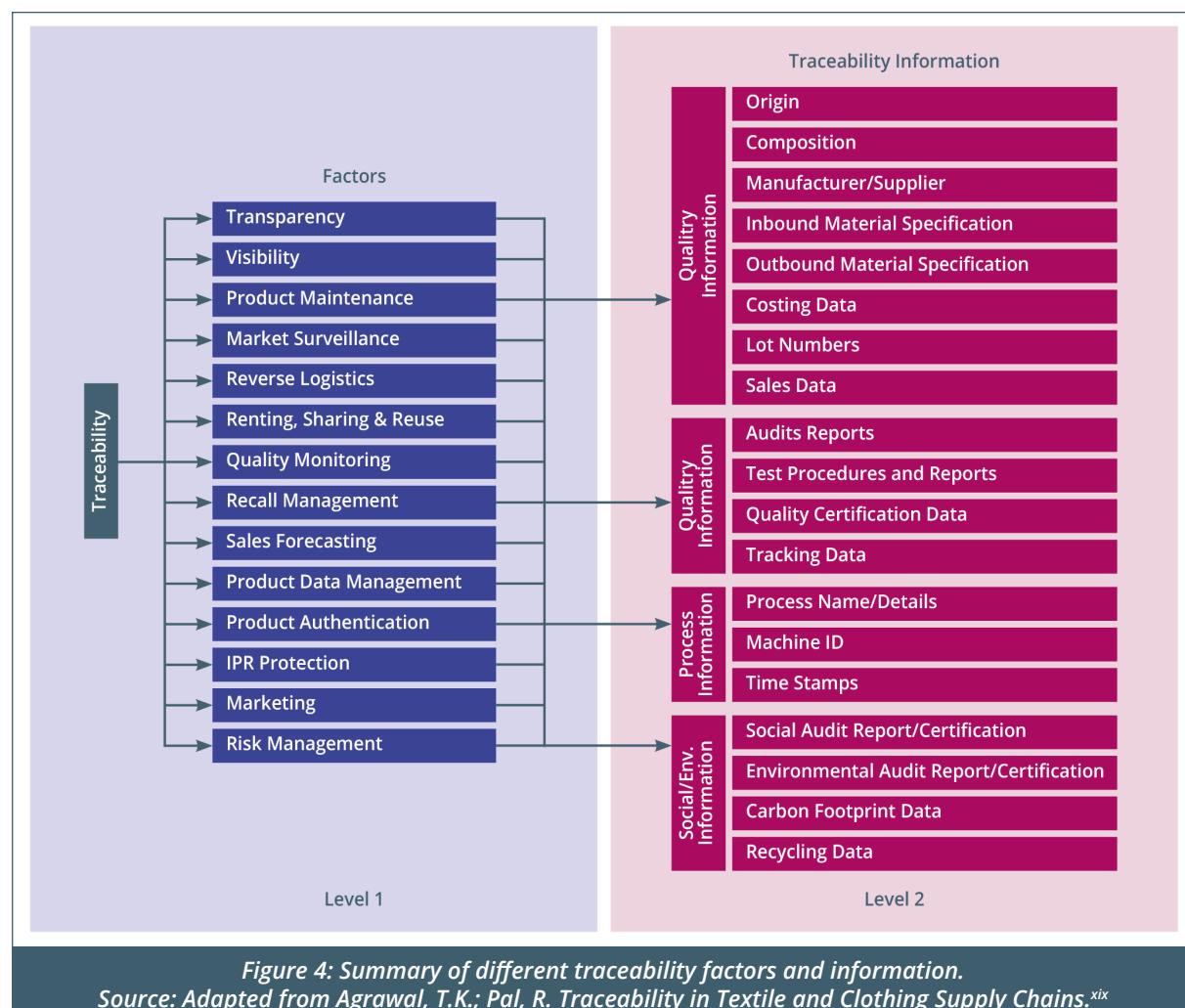


Traceability goes hand in hand with **transparency**. Where traceability gathers data and knowledge throughout the entire supply chain, transparency is the act of disclosing this data to all stakeholders. Taken together, they reveal the extent to which a company has traced its suppliers through its production stages: raw materials, inputs and final stage.^{xvi} Transparency may also be perceived as an umbrella term comprising corporate disclosure of information regarding traceability, supply chain sustainability and buyer purchasing practices.^{xvii}

Fundamentally, TRACEABILITY is about capturing data, and TRANSPARENCY is about sharing that data to build trust with stakeholders.^{xviii}

It is important to further distinguish between internal supply chain transparency (i.e. the extent to which a firm is transparent to itself - also sometimes referred to as visibility) and external supply chain transparency (i.e. the extent to which a firm is transparent to external stakeholders).

Traceability is, however, hard to measure. There is no unit of traceability or metric that exists. To be done well, traceability needs to encompass the whole supply chain and be measured across several factors in real time, of which transparency is one - see Figure 4.



TRACEABILITY AND TRANSPARENCY ARE THE LAUNCH PADS FOR SUSTAINABILITY

Traceability² and sustainability are inexorably linked. No company can accurately calculate their environmental or social impact until they can measure the impact their supply chain has on the planet and people. Good traceability gives companies the tools to assign measurable sustainability metrics to their supply chain, enabling them to identify challenges, risks and opportunities to enhance operational efficiency and cultivate strong supplier engagement.^{xx}

The textile industry is highly fragmented, consisting of various suppliers, manufacturers and other stakeholders. Traceability requires co-operation and information sharing among all members of the supply chain. As the most influential link in the chain, brands and retailers play a critical role in driving such co-operation. In addition, traceability is key to achieving sustainable supply chains and for feeding materials back into supply chains for reuse, remanufacturing or recycling.^{xxi}

Research on traceability in the apparel and textiles industry often refers to its benefits in general, more qualitative terms. Studies refer to the benefits in terms of "enhancing" efficiency, "improving" sustainability, "building" brand loyalty and increasing financial returns.

Because of the far-reaching and cross-cutting reasons for better traceability and transparency, there is a lot of research out there. Academics have written about it. Professional bodies such as McKinsey, Deloitte, Accenture, KPMG with Serai,^{xxii} have all written reports calling for greater traceability and/or transparency. Bain stated that "*visibility and traceability are at the heart of the supply chain of the future.*" NGOs such as the Open Apparel Registry (OAR) and Textile Exchange have also called for it, as well as other bodies such as International Corporate Accountability Roundtable (ICAR).^{xxiii} Planet Tracker supports the view that traceability should be a demand from investors. See Planet Tracker publications: '[Increased soy certification would decrease deforestation](#)', '[Implementing traceability - seeing through excuses](#)' and '[Traceable Returns](#)'.

In the fashion industry, traceability and transparency are areas of concern and focus and are mentioned in industry reports such as Baptist World Aid Australia's The 2019 Ethical Fashion Report: *The Truth Behind the Barcode*; the Fashion Revolution's annual Fashion Transparency Index; and the Business of Fashion's inaugural Sustainability Index. The Business of Fashion also launched the Transparency Index in 2021 looking specifically at the disclosure of 15 of the top brands.

Fashion Revolution's Fashion Transparency Index 2021 reported that 27% of major brands now disclose some of their processing facilities (e.g. spinning mills, dye-houses), while 11% of major brands publish some of their raw material suppliers (e.g. cotton, viscose). The statistics are trending upward as in 2020 they were 24% and 7%, respectively.^{xxiv}

Meanwhile, the Business of Fashion's Sustainability Index 2021 underscored that most apparel companies are still neither collecting nor disclosing the information necessary to minimize their environmental footprint. Moreover, much of the data they do manage to collect is widely considered to be unreliable - self-reported and rarely verified by third parties.^{xxv}

However, while these reports call for better traceability and transparency for social and environmental reasons, they don't fully show the economic incentive for companies to implement full supply chain traceability. There are only a few reports discussing the impact on financial performance of better traceability.

² In this report, we use traceability as a shorthand to encompass traceability and transparency..



REGULATION IS COMING

There are pushbacks to improving traceability. For example, one retailer told us that they have seen resistance in their supply chain, with around a third of suppliers getting on board straight away, another third being more hesitant and another third resisting the change, with the majority resisting the change being from very small order suppliers. However, they see this three-way split as “fairly normal” when it comes to introducing new practices.

The push towards better traceability and transparency will continue despite any reluctance from suppliers and retailers. Much of the reason is due to upcoming legislation, particularly in the EU, which is likely to come into effect over the next five years and will firmly put companies onto a far more sustainable path.

In the EU, there are two main initiatives coming from the European Commission, the recently launched EU strategy for sustainable and circular textiles (also known as EU Textiles Strategy) and a proposal for a Directive on corporate sustainability due diligence.

In March 2022, the European Commission launched the new Textiles Strategy. This sets a path for new pieces of legislation (although this is unlikely to come into force before 2024), around sustainability in all aspects of the textiles supply chain, including new requirements, actions and controls around everything from design, to the release of microplastics, to greenwashing and extended producer responsibility.^{xxvi} Traceability and transparency are likely to be key aspects of this, especially when it comes to providing clearer information and the suggestion of a Digital Product Passport. Indeed, being able to trace products post-consumer will become increasingly important.

The proposal for a Due Diligence Directive, once agreed and enacted (probably not earlier than 2023), will contribute as well to the expanding framework of reporting, meaning clothing brands selling and operating within the bloc (with specific characteristics) will be required to disclose the impact of their operations on the environment and people working within their supply chains.^{xxvii}

Alongside this EU-based regulation, we are seeing other regulation also increasing. For example, in the UK, the Competition and Markets Authority (CMA), has prioritised the fashion retail sector to investigate the environmental claims of products and whether consumers are being misled.





IMPROVING SUPPLY CHAIN TRACEABILITY (AND TRANSPARENCY) CAN IMPROVE FINANCIAL PERFORMANCE

The growing body of research indicates that good traceability can improve financial performance across a range of metrics such as higher return on equity (RoE), lower operating costs and higher net profit margins (NPM). However, the research is fragmented, in part as measuring traceability is not easy – there is no unit of measurement associated with it and it permeates across all business practices and supply chains.

A study by Medcalfe and Miro^{xxviii} (2021) found that individual sustainable practices improve Return on Equity (RoE) in fashion firms by 3% to 4% for transparency and traceability, 2% to 3% for audit and supplier relationships, and 2% for worker empowerment. Their study suggests shareholders may actually demand better sustainable practices because such practices increase profit. Yet importantly, improving sustainability is also in a firm's best interest as those exhibiting strong sustainable practices may profitably deliver industry transformation in supply chain and environmental management while achieving a competitive advantage. Interestingly, this study also revealed that the only sustainable practice that impacts net profit margin (NPM) is environmental management, where a one-point increase in a firm's environmental management grade corresponded with a 0.4% point increase in NPM.

Meanwhile, analysis by KPMG found that investment in sustainability and transparency could provide a number of financial benefits to apparel companies, including lower costs of capital and reduced insurance rates. According to their analysis, a sustainable apparel business can expect to have an average increase in their net profit of 1-1.5% for brands and by 1.5-2.5% for suppliers.^{xxix}

These analyses show the financial and economic benefits arising from better traceability and transparency in the apparel industry. However, there are no studies purely focusing on the financial benefits of better traceability. This is understandable, as measuring traceability is a challenge because it is a systems-wide metric consisting of a number of factors and requiring and producing a variety of information. Therefore, comparing companies on their internal traceability visibility and competency is impossible without verifiable disclosure.

For non-apparel companies traceability has been shown to be an investment in the reputation of a company which has paid off in the long run.^{xxx} Across a number of industries, high levels of supply chain traceability have been found to be particularly beneficial for operating cost performance.^{xxxi}

The textiles and apparel industry currently faces rising pressure to adopt traceability measures and disclose the information gained. Doing so reveals environmental and social issues as well as risks in the supply chain while holding all stakeholders accountable.

Table 1 shows some of the possible financial benefits of traceability for textiles and apparel companies, which fall into the categories of improved profitability (through better efficiency), better risk management (resilience and responsiveness), and increased sustainability.



Table 1: Benefits of Traceability for Textiles and Apparel companies.^{xxxii} Source: Various & Planet Tracker.

Benefits of Traceability and Transparency for Textiles Retailers/Fashion Brands	Financial Impact
Improved Profitability (efficiency)	
Capitalise on rising demand for transparent, sustainable products	Potential for: <ul style="list-style-type: none"> • Higher revenues, • Greater market share, • Improved brand image
Reveal inefficient areas of supply chain where incorporating superior technologies can enhance efficiency and reduce emissions and waste	Potential for: <ul style="list-style-type: none"> • Lower operating expenses • Stronger competitive advantage^{xxxiii} • Cost reductions through resource saving and efficiency programs^{xxxiv} • Reduced carbon footprint
Risk Management (resilience and responsiveness)	
Improve visibility and inventory management; avoid supply chain surprises	Potential for: <ul style="list-style-type: none"> • More predictable earnings, • Accurate forecasting and budgeting • Minimise overproduction • Greater ability to withstand shocks (e.g., COVID, climate change)
Shift to demand-driven, flexible, agile supply chain	Potential for: <ul style="list-style-type: none"> • Increased profit margins by reducing costs • Minimal overproduction,
Enhance supply chain control and security; prevent product tampering and intrusion of counterfeits	Potential for: <ul style="list-style-type: none"> • Better adherence to quality standards • Reduced damage from faulty product and counterfeits • Reduced financial and reputational toll
Enable more effective recall management ^{xxxv}	Potential for: <ul style="list-style-type: none"> • Faster product recall • Lower financial and reputational toll from recalls
Sustainability and Innovation	
Obtain information at post-sales level to promote resale, reuse, recycling and upcycling	Potential for: <ul style="list-style-type: none"> • Improved sustainability • Reduced waste • Reduced financial and environmental costs associated with production • Improved extended product lifecycle, added value and possibility of increased profitability^{xxxvi} (e.g., earnings from product resale in lieu of costs from disposal and replacement)
Compliance with laws and regulations	<ul style="list-style-type: none"> • Better adherence to quality standards • Greater ability to avoid avoiding fines, lawsuits
Measure and report environmental and social metrics, and identify areas to improve the environmental impact	<ul style="list-style-type: none"> • Improvement of environmental impact score annually (either through measurement of Scope 3 or other) • Reduced damage from faulty product and most apparel companies are still not collecting nor disclosing the information necessary to effectively communicate effective stewardship. Moreover, much of the data they do manage to collect is widely considered to be unreliable - self-reported and rarely verified by third parties.
Be able to design products using the knowledge of the supply chain	<ul style="list-style-type: none"> • Design with the supply chain in mind, building more cost-effective, resilient and sustainable products • Embed sustainability directly into the supply chain decision-making process^{xxxvii}



DESPITE THESE UPSIDES, LACK OF TRACEABILITY IS AN ISSUE IN THE TEXTILES SECTOR

Despite these benefits, up until now, traceability has been difficult for companies to implement across the whole supply chain. The arrival of cost-effective and standardised technology and management frameworks have led to a vast array of traceability tools. Robust traceability is now a non-negotiable and investors should push back on the pushback.

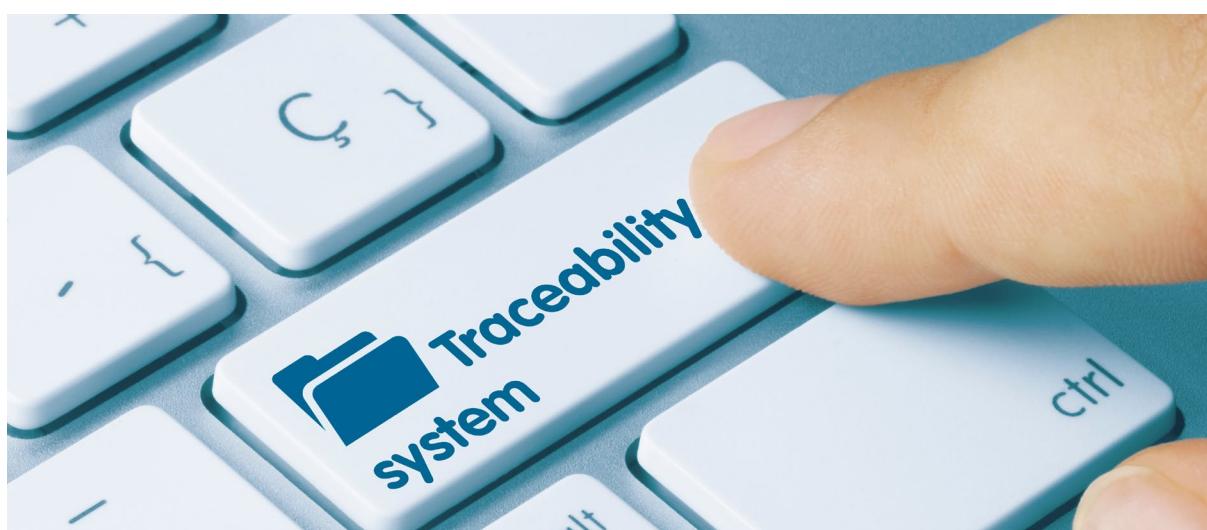
The opaque and complex supply chains of textiles and apparel companies presents a further challenge, making it difficult to trace the origin of many products and components. In addition, the scale of the textiles sector is huge - the Open Apparel Registry (OAR), an open access resource covering the fashion supply chain, currently lists nearly 70,000 individual factories involved in textiles manufacturing - and this doesn't include raw materials producers. The scale of manufacturing adds to the complexity of traceability.

In recent years, there have been calls for better traceability and transparency. The Business of Fashion included "Transparency" as one of six categories in their inaugural Sustainability Index published in March 2021,^{xxxviii} with companies being graded on two 2022 targets:

- 1 achieve full supply chain traceability and disclosed suppliers;**
- 2 analyse and disclose data on environmental and social impact. The average Transparency category score was 48 out of 100 - and this is for fifteen of the largest fashion companies (the fifteen companies were chosen based on the largest revenue producers across the three fashion industry verticals - luxury, sportswear and high street). The authors noted, in particular, that efforts to establish transparent supply chains are lagging and data is limited, hard to find and of dubious quality.**

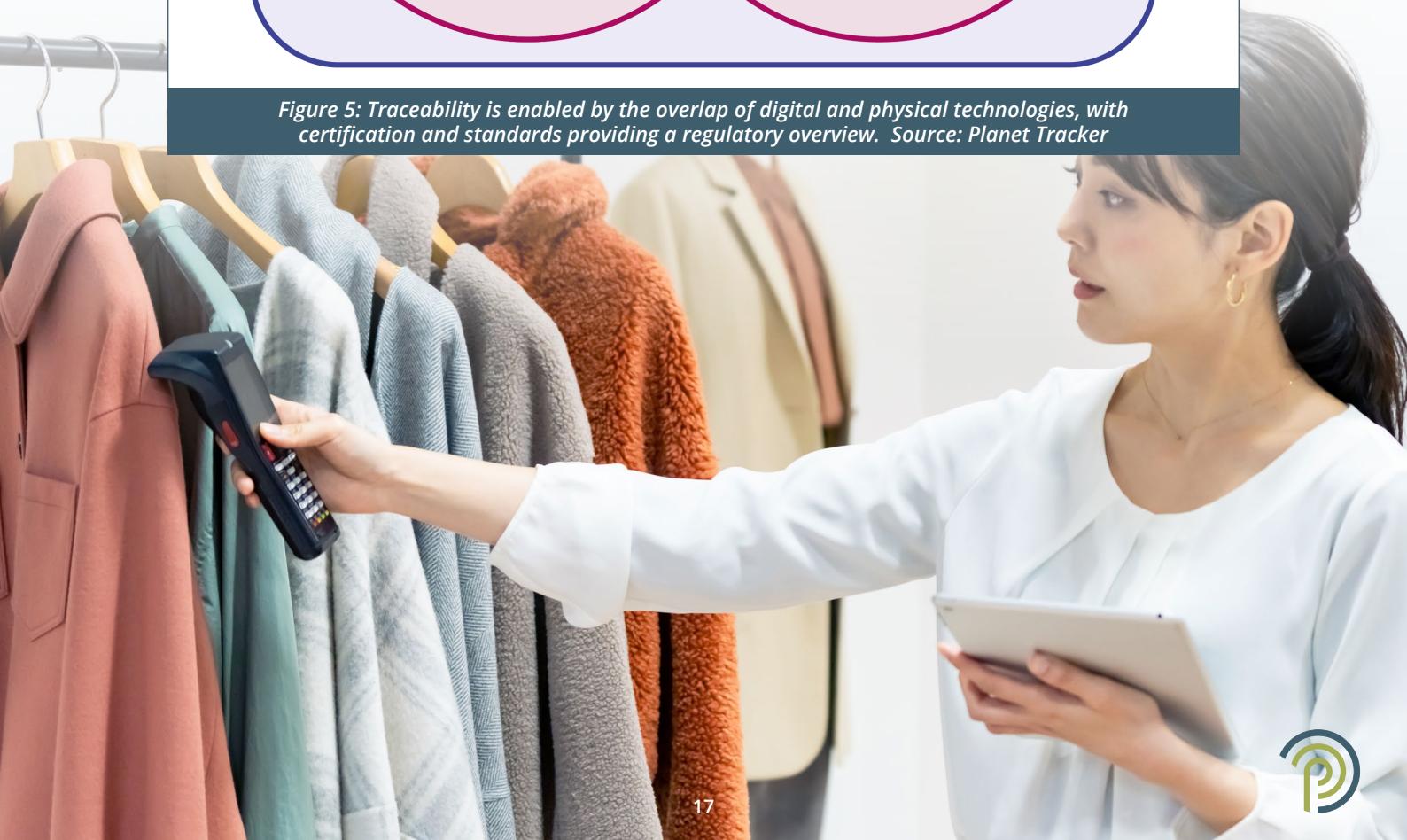
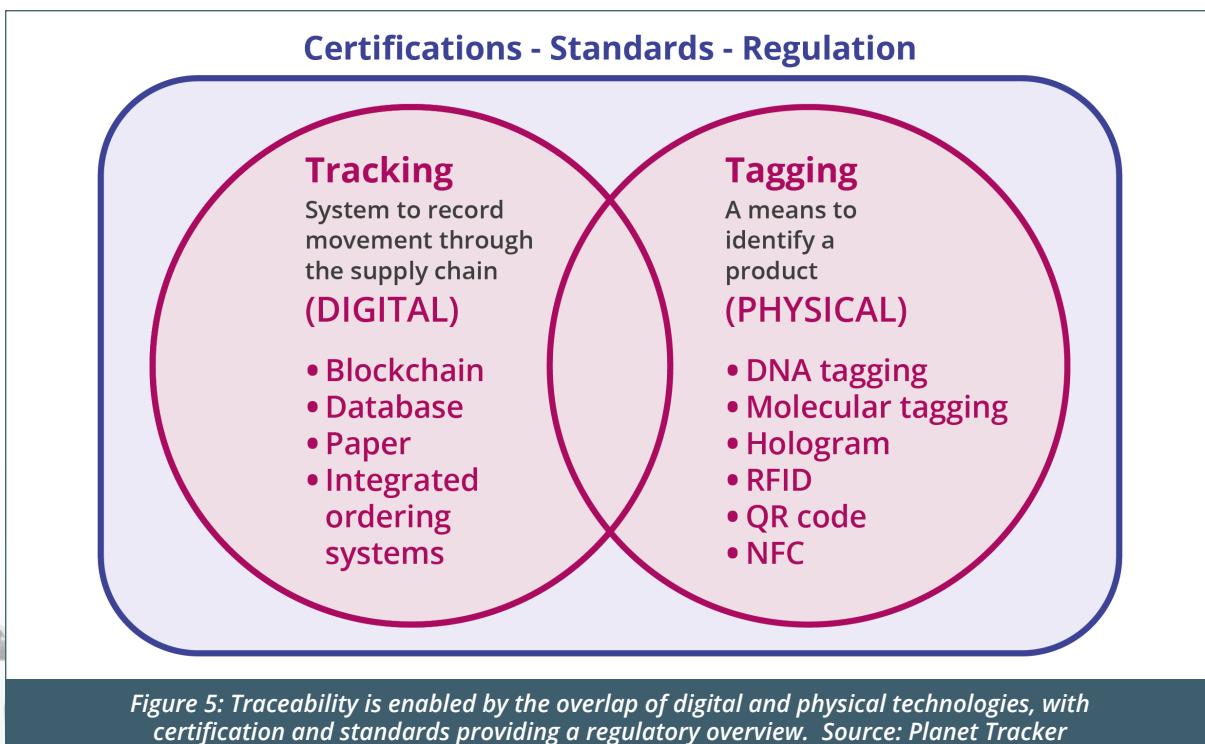
In our own analysis of 52 publicly listed retail companies, 19 (37%) published a supplier list and of those only 11 (21%) had published any suppliers beyond Tier 1.

In this report, we use data from a traceability company to illustrate the clear financial benefits for a company to implement full supply chain traceability. In addition, we can use examples to negate some of the push back that is seen around cost, competitive advantage, return on investment, and operational difficulties.



What does traceability look like?

Traceability tools are generally classified into two categories: digital and physical. Describing these further, digital traceability solutions offer a system to **TRACK** the movement of goods through the supply chain and physical solutions offer a means of **TAGGING** the product as it moves through the supply chain. Overarching these are certification, standards and regulation which could be seen as the third pillar - working with physical and digital tools to ensure checks and balances. Certification and third-party verification also add another layer to check that the tagging and tracking has been correct and building confidence - see Figure 5.





Physical Traceability is the means to identify a product through tagging. It includes DNA tags and barcodes physically interwoven within the fibres or placed on the textile garments. Or other tagging methods much as holograms, RFID³, QR codes or barcodes on other microscopic particles. These provide a physical means to authenticate and track and test a product through the supply chain.

Digital Traceability is the system for tracking the movement of the physical product through the supply chain. It includes databases, blockchain technology and even paper-based systems which brands use to log garments.

Certification is a mechanism which provides an external “check and balance” at significant points along a supply chain. It accompanies regulation and is prevalent especially at the raw material end. We believe **Standards and Regulation** also play into this as products are marketed to the consumer on the back of the regulation. For example, certification might be required by regulation but will arise without it - either because a supplier wants to establish the strength of their product (probably to help maintain their pricing power) or because the end-user or retailer demands it to protect their reputation, brand strength, or pricing power. This is more prevalent at the luxury end of fashion. Regulation is essential to ensure widespread use (beyond situations where there is already a simple commercial incentive) and can level the playing field which some businesses will welcome. In addition, regulation will likely become essential with regard to labelling to prevent greenwashing.

³ Radio Frequency Identification Devices

TECHNOLOGICAL DEVELOPMENTS HAVE SHIFTED THE BALANCE BETWEEN COST AND VALUE

The rise in companies focusing on traceability has come about directly due to technological improvements. On the tracking side, as the cost of information technology and software-based solutions has fallen, the capacity has also increased allowing for larger and larger amounts of information to be recorded and stored, coupled with the rise of ledger-based and more tamper proof systems, such as blockchain. On the physical tagging side, the falling cost of technology has had a marked impact. Developments include tagging systems focused on DNA, holograms and barcodes on microscopic particles which can be embedded into fibres and garments to allow products to be tracked through the supply chain, and even provide ability to show if raw materials such as organic cotton have been diluted through the supply chain. Coupling these with the ability to scan garments with smart phones, it is easier than ever before for traceability systems to be implemented cost effectively through supply chains. For a more thorough discussion of the available technologies and some of the companies working in the space see the Appendix.

In fact, many of the companies (for example Applied DNA Science's CertainT™ and The Movement) now starting up in the space offer a complete package of tagging, tracking, certification and even testing to the market. In addition, technology companies are teaming up with certification to bring a fuller proposition to the market. US Cotton Trust Protocol recently announced a partnership with TextileGenesis to provide continued supply chain transparency and establish a new standard for more traceable and sustainable cotton production.

A snapshot of some of the companies offering traceability solutions and the types of technology they offer are shown in Table 2.

What is particularly noticeable is the relative lack of capital raised across these companies. We recorded less than USD 200 million in funding raised in the last 10 years, especially when compared to the second-hand clothing market which has seen USD 3.5 billion of public and private capital raised since 2015.^{xxxix} We expect more interest in traceability systems as regulation moves companies to continue to adopt traceability tools for their supply chains.

Less than USD 200 million

in FUNDING raised in the last

10 YEARS



Table 2. Traceability Companies and their technologies.
Source: Planet Tracker, Crunchbase, Company reports.

Company	Physical Tagging		Digital Tracking		Certification	Technology Name	Capital Raised USD m
	DNA/ Molecular/ Chemical	QR/ RFID / Barcode	SaaS*	Blockchain			
TruTag Technologies		✓					86
Applied DNA Sciences (ADNAS)	✓		✓		✓	Certain™	52
Primo1D		✓					18
Eon		✓	✓				12
Segura			✓				3
Retraced			✓				1
Haelixa	✓						
Tailorlux	✓						
The Movement	✓		✓		✓	AWARE™	
Security Matters (SMX)	✓			✓			
FibreTrace	✓			✓			
TextileGenesis				✓		Fibrecoin™	
Lyfcycle		✓					
Viji		✓					
SML		✓					
Fairly Made		✓	✓				
Trimco Group		✓	✓		✓	Product DNA™	
Serai			✓				
Circularise				✓			
VeChain				✓			
ChainPoint				✓			
IBM				✓			
Intertek					✓		

*SaaS: Software as a Service, includes database and platform-based offerings





RAW MATERIALS ARE WELL CERTIFIED

For textiles, some parts of the supply chain are faster to adopt new tools than others. The benefits of better traceability tools are perhaps more evident for raw materials such as cotton and viscose, where the provenance of the material is important. Raw textile materials have also been fast to benefit from transferable technology from other sectors. For example, TextileGenesis has created a fibre-to-retail traceability data protocol for the textiles sector based on the GS1 framework - a global traceability standard used in the food and healthcare industries.^{xl} In addition, textiles raw materials such as cotton already have a large number of established certification bodies. For example,^{xlii} the Better Cotton Initiative (BCI) and the Global Organic Textile Standard (GOTS), to name just two.

BCI (an international NGO) is the world's largest cotton sustainability program, comprising more than 1,800 member organizations across the entire cotton supply chain – from farmers to retailers and brands.

Other established certifications have coalesced around recycling, such as the GRS (Global Recycling Standard) and RCS (Recycled Claim Standard), and also around other animal-based raw materials such as the Responsible Wool Standard (RWS), the Responsible Down Standard (RDS) and the Responsible Mohair Standard (RMS).^{xlii}

While certifications and standards are an important pillar of traceability, they don't necessarily guarantee all the material is sustainably produced. For example, some standards employ "segregation" practices, where the certified material is kept separate. However, in textiles, it is not always feasible to segregate sustainable and non-sustainable materials from the perspective of efficiency or manufacturing processes. The mass-balance approach (as used by BCI) takes into account the mixing of certified and non-certified materials, by tracking the material through the supply chain to guarantee that the amount of sustainable content claimed is equal to the amount of sustainable product used.^{xliii} The downside is that more "sustainable" cotton can be mixed with conventionally produced cotton from the ginning⁴ stage onwards.^{xliv} So, arguably, this does not allow for full traceability and consequently, not all supply chain issues can be identified and addressed.

In addition, as addressed by Changing Markets' recent report "[Licence to Greenwash](#)", many of these sustainability certifications have actually failed to drive change, in part due to their voluntary nature, lack of transparency and greenwashing tactics.

⁴ Ginning is the process of removing the seeds and debris from cotton



SIGNIFICANT PARTNERSHIPS IN MAJOR FASHION RETAIL COMPANIES

Over the last few years, we have seen the traceability discussion move beyond just raw materials to consider full supply chain traceability. Initiatives like the [Transparency Pledge](#) - have played a huge part in getting companies to be more transparent with their supply chains. The United Nations Economic Commission for Europe (UNECE) is also tackling the issue with their policy recommendation "[Enhancing traceability and transparency of sustainable value chains in the garment and footwear sector](#)" responding to the increasing demand for policy and legislative action for responsible business conduct in global value chain. It is clear that traceability and transparency will remain a vital part of the future of sustainability of textiles.

According to the brands and retailers themselves, traceability and transparency are top of their agenda. In Table 3, we highlight just a few of the traceability initiatives companies are undertaking. Interestingly, many of these are through start-up traceability companies, or through partnerships with other brands. Of course, many companies do not subscribe to just one technology.



Table 3: Examples of Companies and brands and their approach to traceability and transparency.
Source: Planet Tracker and Company Reports.

Company/Brand	Traceability and Transparency Approach
LVMH	Recently partnered to develop Aura Blockchain Consortium , the world's first global luxury blockchain. Aura represents a single solution to the shared challenges of responsible sourcing, sustainability and communicating authenticity information, providing a high level of traceability throughout the product lifecycle.
Prada	
Cartier	
Patagonia	Developed The Footprint Chronicles in 2007 to trace and disclose its supply chain, enabling customers to gain a better understanding of the environmental and social impacts of their purchases. Uses organic cotton, Traceable Down, Responsible Wool Standard wool, natural rubber and various recycled materials.
Nike	Nike Manufacturing Map provides information about the independent material suppliers and factories that manufacture Nike products, including factory name and location as well as items produced there. Nike is also trialling blockchain with RFID for tracking products in its supply chain.
VF Corp	VF Traceability Map provides traceability mapping online for over 100 "iconic" products. This allows VF to trace the full end-to-end supply chain, from raw materials conversion to product distribution. The company is then able to use the data to identify opportunities for sustainability or worker well-being improvements deep within its global supply chain.
BESTSELLER	Recently celebrated the completion of the Viscose Traceability Pilot, a consortium project with Fashion for Good and Kering using TextileGenesis' blockchain tracing technology to trace sustainable viscose through the supply chain – from fibre production to garment production. In this pilot, BESTSELLER successfully traced more than 22,500 styles.
Kering	Partnered with Albini Group, Oritain and Supima to achieve a more sustainable business model through 100% traceable organic cotton. The naturally-occurring chemical properties of the actual fibre is analyzed using forensic science and statistical analysis, generating a unique chemical fingerprint which links the cotton to the field where it was grown. Kering is now piloting this technology for leather.
Levi Strauss	Collaborated with The R Collective to produce a fully traceable denim collection designed to reduce the carbon footprint of garments using label QR code and Internet of Things technology. Levi's also uses traceable viscose and lyocell, including Lenzing's Tencel, which employs a process that recycles the chemical solvents used to produce the fibre, and requires less water and energy than the generic version.
H&M	Partnered with TextileGenesis which employs blockchain technology to track and verify the use of sustainable fibres from fibre to garment.
Ralph Lauren	Launched Digital Product IDs QR-based tracking system to improve supply chain visibility and combat counterfeits, with the aim of expanding to cover the entire Polo line. Consumers will be able to scan the QR tags to obtain product details, authenticity information and styling tips.
Reformation	Launched a new collection featuring FibreTrace , a technology that embeds traceable, scannable pigments directly into the fabric of Reformation jeans. Customers are able to track their denim's entire lifecycle using their smartphones.



WORK STILL NEEDS TO BE DONE ON THE TRANSPARENCY OF THIS DATA

While there is no unit of measurement for traceability, analysts have specific ways to track companies who are utilising more traceability in their supply chains. Much of this comes with more transparency by companies. This is a more delicate area - while there is a clear business and environmental reason for full supply chain traceability, transparency can cause more problems for companies who want to protect their business practices. But the market and regulation are moving towards more transparency rather than less, so companies and investors need to start getting comfortable with these likely higher levels of transparency going forward.

The first step to identify and address environmental and human rights infringements in the supply chains is for brands and companies themselves to fully understand and have visibility of them. Hence, civil society actors monitor how many companies publish information on their supply chains and to what degree.

In 2021, only **11%** of brands **PUBLISHED** their **RAW MATERIAL** suppliers

Fashion Revolution annually publish their "Fashion Transparency Index", which analyses and ranks 250 of the world's largest fashion and retail brands' public disclosure of human rights and environmental issues, of which supply chain traceability is one key sector. In the 2021 version, they found that while supply chain disclosure continues to improve among major fashion brands and retailers, only 47% of brands disclose their Tier 1 garment manufacturing facilities and this number almost halves again to 27% for disclosure of wet processing and spinning facilities - see Figure 6.

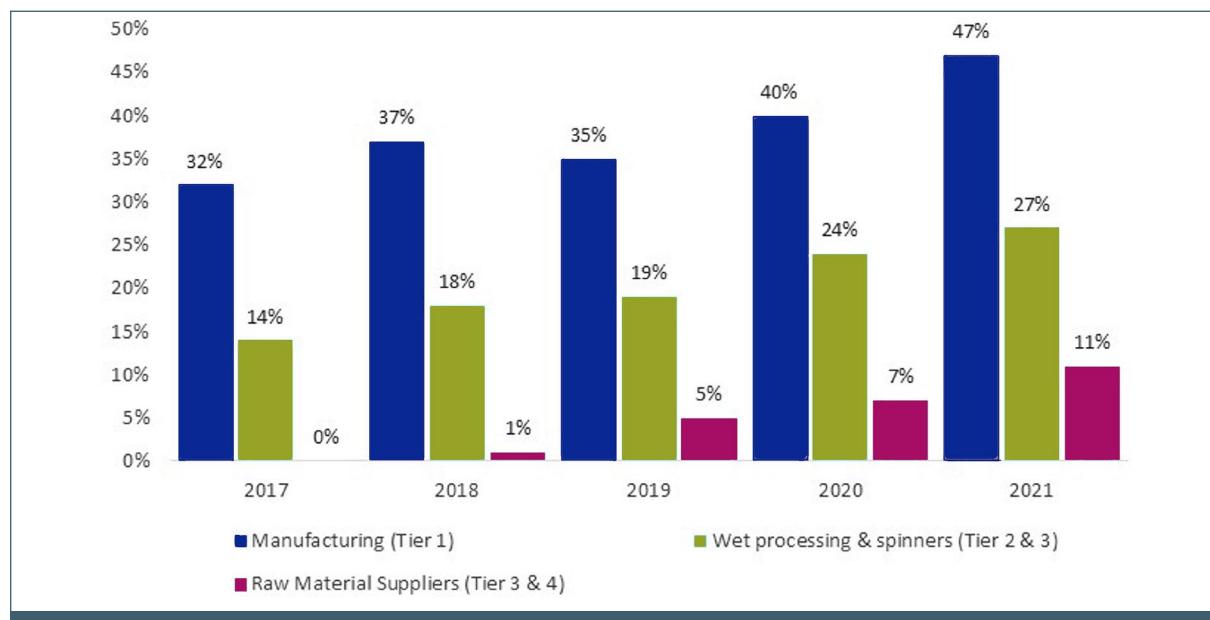


Figure 6: Fashion Transparency Index: The percentage of brands publishing their suppliers has been rising but is still lacking particularly below the manufacturing level. Source: The Fashion Transparency Index

In 2021, only 11% of brands published their raw material suppliers. The overall brand traceability score was just 19% in 2021 (up from 16% in 2020). This was calculated not just from the disclosure of suppliers but also the level of detail on the suppliers and the information they themselves provide.



TRACEABILITY CASE STUDY

INTRODUCING SEGURA

We have worked with Segura - see box on page 30 - to show the financial upside to introducing better traceability. Segura have shared with us the possible return on investment (ROI) calculation they share with new customers. It tells a compelling story, with the realisation of real financial impacts including increased sales, a margin uplift, lower costs and risk mitigation. Alongside these come environmental benefits such as better supply management, leading to reduced CO₂e emissions from reduced air freight. We show this in Figure 7.

While other traceability systems are out there, it is reasonable to assume that the benefits are similar across a range of technologies. One Segura customer told us that that a key differentiator between Segura and its competitors is the fact that Segura can integrate at the purchase order level, which allows a lot more tracking and less manpower than other systems, and importantly allows them to produce a "bill of materials" allowing them to know all the components in each product (from material to extras like buttons, leather and metal components) and from where it has been sourced.

For sales, Segura estimate a 1.2-3.7% increase in revenues from its system allowing a faster speed to market. In addition to this is the ability to claim rebates from 2 to 5x the current level by catching unauthorised suppliers (rebates are around 1% of sales). Overall, we calculate this gives a potential sales uplift of 2-7% for the retailer. Now clearly this is not necessarily a good thing for environmental impact, as more product produced equals more resource use. However, part of it may just be selling more of what is already produced, allowing for better efficiency.

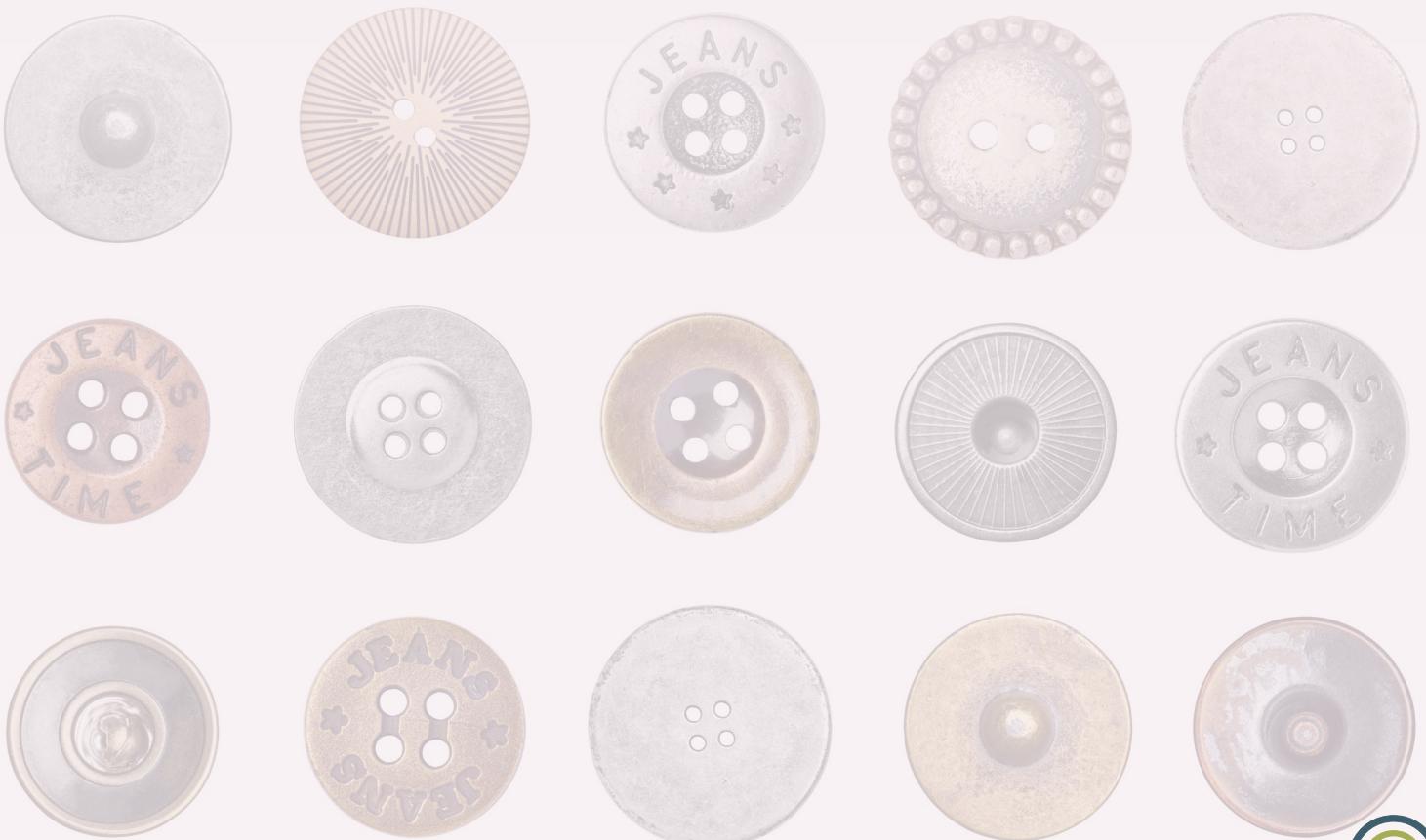
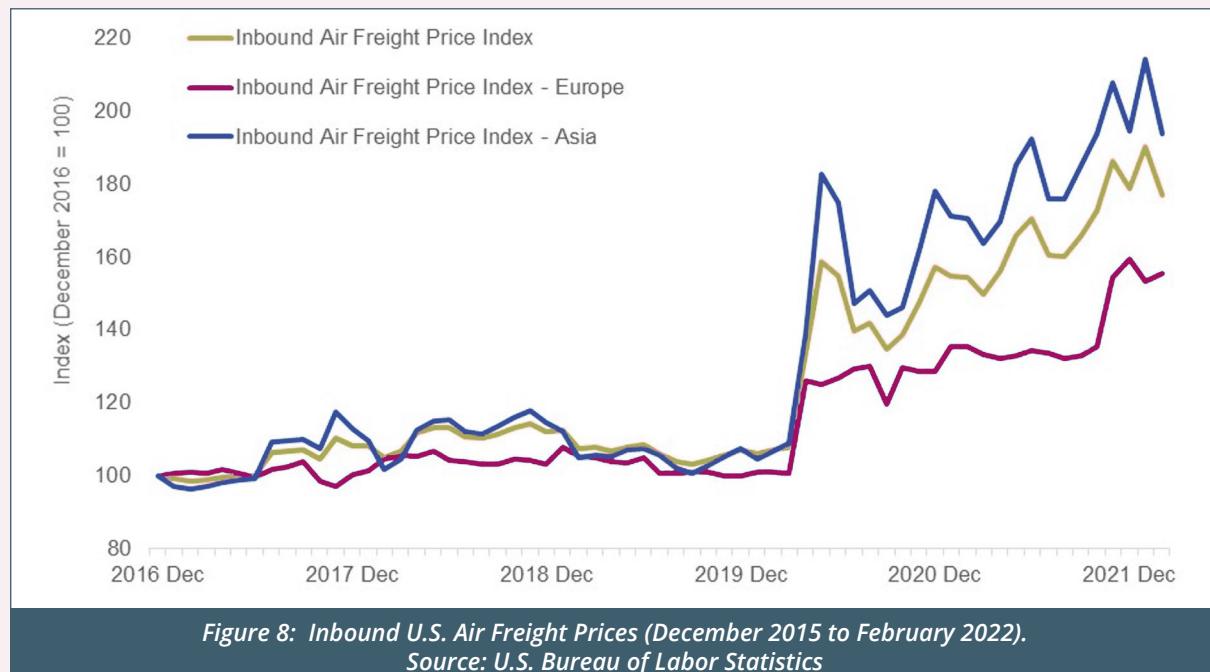


Figure 7: Segura base their RoI Calculation for new customers from their previous performance.
 Some of these we assess as having a positive (green), negative (red) or unclear (amber) for the environmental impact. Source: Segura

Metric	Average Movement	Reason	ESG Impact green = positive, red = neg (PT assessment)
Increased Revenue			
Sales	1.2-3.7% increased sales	Faster speed to market through digitised supply chain, therefore more potential sales.	More sales, more resource use
Rebate	2x to 5x current rebate collected	Where rebate exists, Segura combats non-authorised, non-rebate component suppliers.	Non-authorised suppliers have higher ESG risks
Total Sales Impact	2-7%		More sales, more resource use
Increased Margin			
Reduction in late deliveries	3-7% Net Profit increase	Reduction in late deliveries means longer shelf time therefore more products sold at higher prices.	Fewer deliveries, less waste
Reduced Costs			
Reduction in Air Freight	50-70% Reduction in Air Freight	Critical path alerts reduce late component deliveries as action can be taken early to avoid air freight.	Reduction in CO2e emissions from air freight
Consolidation of suppliers/orders	3-15% reduction in component costs	Once you can see purchasing habits, it's easier to make good decisions about consolidation. Can take advantage of bulk buying discounts. For example, by consolidating care label supply, saved one company \$500k	Fewer deliveries, less waste
Reduction in production errors	1.3-1.9%	Monitoring of ordering between tiers, reducing manual errors especially in late-stage variable data. Orders are checked and verified on the system before production. With full audit trail.	Better audit trail and transparency through supply chain, reduction of waste
Tracking of defects/reduced returns	Variable	Fake zips/hangers etc.	Improve clothing quality
Reduced Risks			
Reduction in fines and lawsuits	Variable	Fines related to environmental malpractice can be multi-million.	Identifying areas of risk faster should result in a positive impact
Modern Slavery Act 2015	Possible Unlimited Fine	MSA 2015 (UK) poses unlimited fines for slavery found at ANY point in your supply chain. ^{xiv}	
Reduction in support staff (or fewer required for expansion)	Depends on current set up	No longer a need to chase all suppliers constantly for updates in progress of production. System monitors, manage exceptions only.	Fewer staff lowers risk, but also reduces jobs



In terms of better margins and costs, Segura highlight a number of ways they see improvement - for example, air freight cost reduced by a staggering 50-70%. This is due to making sure orders are completed on time and essentially allowing for order efficiency. This reduction is not insignificant; according to the U.S. Bureau of Labor Statistics, since March 2020, air freight prices from Asia to the US have risen by 78% and by 14% in the last 12 months - see Figure 8. This is especially timely as the whole apparel industry continues to feel the pressure from supply chain issues.



Another one-off 3-15% reduction in costs came from the system allowing the identification of where suppliers can be consolidated, while reduction in production errors from component mismanagement can be another 2% decrease in costs.

However, to disaggregate these changes into a simple equation where better traceability = X% in sales, X% decrease in costs and therefore X% improvement in profitability is difficult. For example, reducing late deliveries may result in more product being sold at a higher price, but it is hard to separate that out. Therefore, we use the numbers from Segura regarding net profit increase as a conservative estimate of how a traceability system results in better profitability and therefore a financial return.

As such, we calculate the RETAIL INDUSTRY NET PROFIT that could be released from introducing a traceability system such as that used by Segura could be between USD 3 billion and USD 8 billion (based on a 3-7% increase in the industry net profit of USD 80 billion.⁵). This represents a NET MARGIN IMPROVEMENT of between 15 and 40bps.⁶ The average net margin of retailers in the large Planet Tracker retail universe is 5.3%.

⁵ Based on Planet Tracker data from mapping over 14,000 Textiles companies and allocating them across the textiles supply chain.

⁶ Bps = basis points. There are 100 basis points in one percentage point.

In addition to these margin and revenue improvements there is an important factor, especially when it comes to environmental and social supply chain management, namely better risk management. The ability to have really good visibility through the supply chain means that companies can have a much better understanding about all the materials they are using in their products. This is particularly important in California in the US, where bounty hunters (lawyers), have created a lucrative business in finding non-compliant products. The lawyers perform lab grade tests and then can file lawsuits, which often result in fines of millions of dollars of which they claim a portion.^{xlvi} They mainly target products that are unlabelled or mislabelled and contain one of 900 chemicals with the most common actions around lead (found in synthetic fibres and metal accessories), phthalates (synthetic fibres and coatings) and cadmium.^{xlvii}

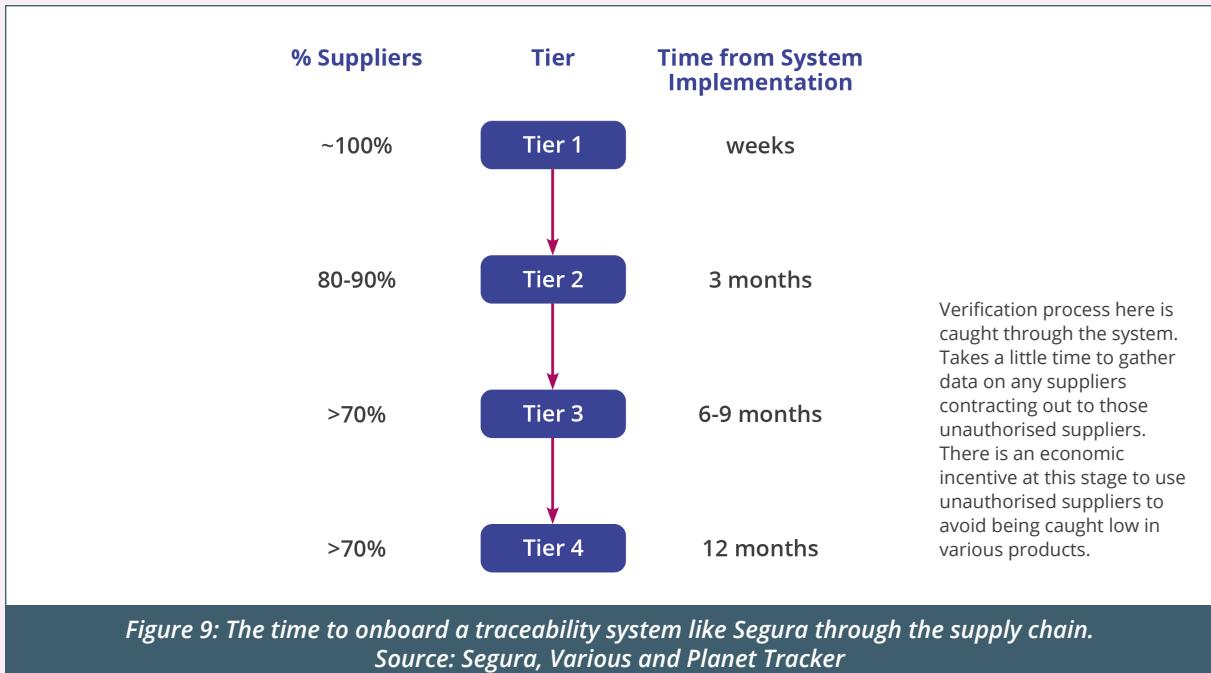
This reinforces our view that:

- **With current technology, there is no excuse for a lack of traceability in the supply chain.**
- **Better traceability results in an increase in efficiency and cost savings.**
- **Better traceability also allows more efficient monitoring and measuring systems to be in place, providing better data.**

While many brands and retailers have direct relationships with their Tier 1 suppliers, Segura also note the importance of supplier and customer relationships further into the supply chain to enable this data collection. For example, the importance of a relationship between, say, Tier 2 suppliers and their Tier 3 suppliers and Tier 1 customers.

For any traceability system, gathering visibility through the whole supply chain always takes time. While tracing Tier 1 suppliers is a simpler task (and one which companies themselves can do), it is harder and takes more time to gather data further down the supply chain. Figure 9 shows the rough time that a system like Segura's can take to onboard the supply chain. It takes more time further down the supply chain, with around 80-90% of Tier 2 suppliers being captured within 3 months and then more than 70% of Tier 3-4 suppliers within a year. This is in part because the economic incentive to use unauthorised suppliers is greatest through these lower Tiers and, as such, this is where brands and retailers are most likely to be caught with inadequate materials and products. A system that can capture a significant part of the supply chain relatively quickly is attractive to companies and investors who are increasingly coming under regulatory pressure.





*Figure 9: The time to onboard a traceability system like Segura through the supply chain.
Source: Segura, Various and Planet Tracker*

This highlights the fact that the incentive for brands and retailers to implement a robust traceability system is clear both for economic and sustainable reasons. However, the benefit for the supply chain is not as clear. For example, as we see above, financial benefit for brands and retailers can come through the consolidation of the supply chain - which could result in some suppliers losing business. Interestingly, we see cases where adoption is both faster than expected (as suppliers comply due to the requests coming from the people paying their bills), and slower as some smaller suppliers risk losing business.



WHO ARE SEGURA?

Set up in 2012, Segura is a SaaS company providing multi-tier transparency, mapping and reporting, to achieve supply chain transparency. UK based, it works with some of the largest names on the UK high street, including River Island, Whistles Hobbs, Phase Eight, Ted Baker and Reiss, providing sustainable supply chains to more than 5,000 locations in 80 countries across the world, working with their downstream providers to fully map their supply chains. More information can be found on their website [www\(segura.co.uk](http://www(segura.co.uk)

Segura started in the textiles and apparel space as they recognised sub-contracting can be a huge problem for brands, and a system that enables brands to audit these practices remotely would be hugely beneficial. The interest in their system is especially relevant today as brands and companies seek to mitigate ESG and reputational risks.

As their software has developed they have moved from a purely order based system to one that is more of a compliance system, capturing a lot of data from a variety of sources, encompassing for example geo-political risk, human rights and emissions data. They represent one of the most mature players in the space compared to other similar traceability platforms such as Trimco Group's Product DNA and TrusTrace.

Focusing on the commercial opportunity of their technology (enhanced supply chain management, operational efficiency, supplier consolidation and supplier 'win-wins'), enabling companies to see a robust traceability system as a way for companies to meet stakeholder and legislative pressure, as well as being self-financing and even drive margin gains and bottom-line improvement.

Supply chain management: Segura acts as a point for data collection and reporting, providing a consolidated operational view to provide a consolidated scorecard for all of their supplier and new supply chain insight. They particularly believe they can show better strategic management of the supplier base especially over Tier 2 to 5 sub-suppliers, providing the visibility necessary to identify and mitigate supply chain risks.

Operational efficiency: This comes from the ability to pro-actively manage order activity and in doing so, also encourage suppliers to adopt best practice, creating efficient and cost-effective processes. The visibility of supplier orders carries through to components (packaging, trims, fabrics, threads) providing new opportunities to **consolidate the supplier base** and benefit from more robust commercial negotiation, **potentially creating millions of annual cost savings**. This visibility also provides an opportunity to pro-actively manage rebates that might otherwise be lost.

Supplier win-wins: For example, UK based Debenhams introduced a nominated supplier programme for its branded packaging and used Segura to access real time compliance reporting - to see which of the suppliers had, or had not, been adhering to the new policy.





WHAT ARE THE NEXT STEPS FOR TRACEABILITY?

Although the number of companies involved in traceability has increased rapidly over the last few years, when it comes to the amount of their supply chain fully traced, the numbers are more opaque. As such, there needs to be more visibility over traceability.

For example, VF Corp's traceability map shows the supply map for around 100 of its most popular products - but with 13 brands under its umbrella at the time of writing, this represents a small sample of the much larger number of items it produces.

In addition, all these systems can take time to reach many of the suppliers further down the chain and reaching 100% of all suppliers is a struggle, and that is without taking into account any fraud going on in the supply chain.

Other questions remain about what the traceability solutions of the future will look like. Will we see a survival of the fittest, with the winners offering the most complete solution and be able to integrate ESG data and systems into their deliverables? Will we see solutions merge into a few mega-platforms perhaps with certain individual tagging technologies being able to be used in these? Will companies develop their own in-house systems? Or will smaller technologies continue to have a place? And importantly, how much of this data will be shared - will we see true "co-operativity" across the brands.

The possibilities are important. For example, the ability to start overlaying all this digital traceability and transparency programmes onto the Open Apparel Registry would enable a number of opportunities in the space. Some of these could be used to (as pointed out by Rakesh Vazirani, the Head of Sustainability Services from TÜV Rheinland Group):

- a Identify Regulatory barriers**
- b Understand funding gaps**
- c Gather regional issues like groundwater pollution**
- d Gather macro/regional data about factory performance**
- e Map textile material flows AND identifying efficient pathways for recycling**
- f Identify regions/areas with risk of forced labour**
- g Identify Areas with concentration of embodied Carbon/GHG**
- h Future: EU Digital Product Passport**





CALL TO ACTION

In conclusion, traceability offers a vital way for companies to gain a deep understanding over their supply chains. This increased understanding will come with financial benefits and crucially, environmental and social upsides. There are challenges still and these will remain, but our conclusion is simple - the technology is there, the companies just need to implement it - and this is where pressure from investors is key.

We see brands and retailers and their investors being aligned on traceability. Indeed, brands and retailers are themselves key investors in their own supply chains.

FOR INVESTORS

- **Investors** need to demand full implementation of traceability through company supply chains to capture cost savings and reduce environmental impacts.
- **Investors** need to demand full transparency from brands for their suppliers.
- **Investors** need to push brands to partner with their supply chains to enable full transparency.
- **Investors** should pressure brands to reinvest a portion of cost savings from better traceability to improve other environmental areas.
- **Investors** should encourage thought leadership investments in traceability and decarbonization which have longer paybacks beyond hitting next quarter or end of year sales targets.

FOR BRANDS AND RETAILERS

- **Brands and retailers** need to undergo a “mental shift” to understand their role as investors in their own supply chains.
- **Brands** need to implement full traceability in their supply chains to capture cost savings and better monitor and reduce environmental impacts.
- **Brands and investors** should utilise the knock-on effects of better traceability to allow better measuring and monitoring of environmental metrics throughout the supply chain.
- **Brands** should cover the costs of these systems.
- **Brands** should be willing to dig deeper on suppliers unwilling to introduce traceability systems.





APPENDIX

Traceability Tools	Explanation
Physical (Tagging)	<p>Includes DNA tags, RFID and barcodes which are either embedded physically within the fibres or placed on the textile garments. This allows garments to be digitally traced through the supply chain giving brands a physical guarantee of traceability.</p>
DNA or chemical tag	<p>DNA or chemical tags are a tool of physical traceability, examples of luminescent pigments/liquid marker formulations/molecular identifiers are embedded on the fibre of a textile product, commonly at the raw source or the spinning mill upon the processing of fibres. These embedded tags are indestructible and designed to allow the entire textile processing cycle to be traced, from processing to end-of-life treatment.</p> <p>Once tagged, data on the fibre is tracked, recorded, and uploaded to a cloud database. These tags are able to detect the blending of premium, responsibly sourced fibres with lower quality, non-certified materials as well as mixing of different materials, so as to guarantee traceability. Multiple companies have emerged in this space and each with their own proprietary DNA tag which requires selective hardware devices to scan and trace the fibres, guaranteeing the integrity of the product. Examples of companies using DNA technology include FibreTrace, Haelixa, Security Matters, TextileGenesis and Applied DNA Sciences.</p>
RFID	<p>Radio Frequency Identification Devices (RFID) are small wireless tags placed on textile garments which transmit a radio frequency signal. Each tag is coded with information about the item's characteristics such as its size, colour, price, and date/country of manufacture. The data stored in the tag is picked up by an RFID reader - the reader accumulates data and presents it to the user via an inventory management computer software. This inventory creates a central database, storing information on garment location and timing, improving the traceability of individual items.</p> <p>This approach aims to improve the efficiency and transparency of the textile retail supply chain. With continued product innovation, nano RFID tags could become a reality. At which point, they could be ironed or stitched on garments and allow for better informed consumer decision making. Examples of RFID companies include Eon, ThreadFast Apparel and Avery Dimension.</p>
Barcode (Microscopic particles)	<p>TruTag Technologies is developing a physical traceability tool for the textile industry. Currently, their barcode technology is used in the pharmaceutical, beef and electronic components industries. They use microscopic silica particles with engineered pore structures to etch them into material components. The pore structure represents a specific signature (similar to a QR code/NFC reader) that can be decoded by mobile phones and TruTag readers. This approach is limited to end products of textile garments yet allows consumers to unveil the traceability of their textile garments.</p>



Traceability Tools	Explanation
QR code/NFC reader	<p>QR codes/NFC readers are attached to textile garments in clothing retailers for use by consumers. They assign garments with a unique ID containing information about the garment's original price, material composition, dye processes and other key features. This process helps recycling companies better understand what to do with the garment, allows brands to refurbish old clothes, and assists in the authentication of luxury products for resale.</p> <p>Lyfcycle is an example of a company which uses QR codes to reveal an interactive map outlining what the product is made of, where it came from and who made it. This can be used to help consumers better understand the environmental impact and if there are inefficiencies in the supply chain. Another example of a QR code/NFC reader company is Viji.</p> <p>While most organisations outsource their QR codes, this could be susceptible to manipulation if imperfect information is provided. An approach of full company traceability is explored below. An example is Sheepinc which employs an NFC reader to provide a guarantee of true insight into the traceability of the textile garment since the organisation manufactures the product and administers the NFC reader.</p>
Digital (Tracking)	Includes databases, blockchain database and QR codes/NFC readers which brands use to log the traceability of the textile garments.
Database	<p>Companies offering database solutions to allow manufacturers/clothing retailers to upload traceability data into a database which then enables consumers to analyse product information. This approach allows upstream suppliers to understand the traceability of their raw materials and share proof with the stakeholders that traceability is guaranteed.</p> <p>This approach requires suppliers to connect to the private supply chain database network to then provide information on the source of their products. While this approach is simple, it necessitates that suppliers guarantee they are providing perfect information. In practice, if a supplier does not have full traceability, this approach may be susceptible to manipulation. Examples of companies leading traceability databases include Serai, Retraced and Segura.</p>
Blockchain database	<p>Blockchain databases are similar to traditional traceability databases; however, they create a decentralized, peer-to-peer network that connects all the stakeholders in a textile value chain – from farmers, designing houses, raw material suppliers, manufacturers, transporter, distributors, retail outlets to consumers.</p> <p>Blockchain databases in the textile industry rely on the creation of a physical to digital link between goods and their digital identities. This is achieved using a cryptographic seal or serial number which acts as the physical identifier, linking back to the individual product's "digital twin".</p> <p>The decentralization of a blockchain network ensures supply chain transparency as entities which disrupt the supply chain will be held accountable for the traceability of the product. This network can therefore detect and provide information where a counterfeit product, material dilution or material substitution may have occurred to challenge the authenticity of the product. Examples of blockchain database companies include IBM, ChainPoint and Licof.</p>

Traceability Tools	Explanation
Certification	Includes organisations who can independently verify the complete traceability of their textile garments or organisations which have created standards which aim to enhance traceability and transparency in the textiles supply chain.
Certifications	<p>There are several examples of different standards in the space. Most of the certification is related to raw materials. For example Global Organic Textile Standard (GOTS), Better Cotton Initiative's Better Cotton Standard System, Organic Content Standard (OCS), US Cotton Trust Protocol (USCTP), Cotton made in Africa (CmiA) and CottonConnect's REEL Cotton Code. Each is independently verified by a third party. The standards enhance traceability and transparency, improve environmental sustainability, ensure sustainable livelihoods for farmers and factory workers, and protect human rights (e.g. prevent child and forced labour, ensure decent working conditions).</p> <p>Other standard providers are the Global Recycling Standard. Large certification providers include Intertek, USB Certification, The Leather Working Group and Bureau Veritas.</p>
Company led initiatives	<p>This approach captures companies who aim to make traceability and transparency a core part of their brand. It is a growing area.</p> <p>Company examples are those where the company name is synonymous with sustainability for example Sheepinc, Asket or Patagonia.</p> <p>VF Corp has provided Traceability Maps allowing the consumer to visualise how and where a few products are produced.</p> <p>However, this approach is not necessarily without sustainability issues. In addition, due to the close supplier – retailer relationship and sourcing practices it is more suited to small production batches.</p>



DISCLAIMER

As an initiative of Investor Watch, Planet Tracker's reports are impersonal and do not provide individualised advice or recommendations for any specific reader or portfolio. Investor Watch is not an investment adviser and makes no recommendations regarding the advisability of investing in any particular company, investment fund or other vehicle. The information contained in this research report does not constitute an offer to sell securities or the solicitation of an offer to buy, or recommendation for investment in, any securities within any jurisdiction. The information is not intended as financial advice.

The information used to compile this report has been collected from a number of sources in the public domain and from Investor Watch licensors. While Investor Watch and its partners have obtained information believed to be reliable, none of them shall be liable for any claims or losses of any nature in connection with information contained in this document, including but not limited to, lost profits or punitive or consequential damages. This research report provides general information only. The information and opinions constitute a judgment as at the date indicated and are subject to change without notice. The information may therefore not be accurate or current. The information and opinions contained in this report have been compiled or arrived at from sources believed to be reliable and in good faith, but no representation or warranty, express or implied, is made by Investor Watch as to their accuracy, completeness or correctness and Investor Watch does also not warrant that the information is up-to-date.



This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.



REFERENCES

- i See the Planet Tracker Blog, "Implementing Traceability: Seeing Through Excuses", <https://planet-tracker.org/implementing-traceability-seeing-through-excuses>
- ii For more information please see https://ec.europa.eu/environment/strategy/textiles-strategy_en
- iii For more information please see https://ec.europa.eu/info/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en
- iv For more information please see <https://www.nysenate.gov/legislation/bills/2021/A8352>
- v <https://www.thetimes.co.uk/article/boohoo-fashion-giant-faces-slavery-investigation-57s3hxcth>
- vi <https://www.theguardian.com/business/2020/jul/06/boohoo-leicester-factory-conditions-covid-19>
- vii <https://newlinesinstitute.org/china/coercive-labor-in-xinjiang-labor-transfer-and-the-mobilization-of-ethnic-minorities-to-pick-cotton/>
- viii <https://newlinesinstitute.org/uyghurs/the-uyghur-genocide-an-examination-of-chinas-breaches-of-the-1948-genocide-convention/>
- ix Xinjiang's cotton production accounts for 84.9% of the country's total proportion to a new high, Xinhua News Agency, January 2, 2020, <https://archive.ph/Ktpph>
- x Statement from H&M on Xinjiang released in March 2020, <https://hmgroup.com/sustainability/fair-and-equal/human-rights/h-m-group-statement-on-due-diligence>
- xi Statement from Nike on Xinjiang released in March 2020, <https://purpose.nike.com/statement-on-xinjiang>
- xii Laura T. Murphy, et al. (2021). "Laundering Cotton: How Xinjiang Cotton is Obscured in International Supply Chains." Sheffield, United Kingdom: Sheffield Hallam University Helena Kennedy Centre. <https://www.shu.ac.uk/helena-kennedy-centre-international-justice/research-and-projects/all-projects/laundered-cotton>
- xiii <https://www.theguardian.com/world/2013/jan/15/horse-dna-found-supermarket-beefburgers>
- xiv <https://www.theguardian.com/environment/2021/mar/15/revealed-seafood-happening-on-a-vast-global-scale>
- xv ISO 12875:2011(en) Traceability of finfish products - Specification on the information to be recorded in captured finfish distribution chains. <https://www.iso.org/obp/ui/#iso:std:iso:12875:ed-1:v1:en>
- xvi Medcalfe, S. and Miralles Miro, E. (2021) 'Sustainable practices and financial performance in fashion firms', Journal of fashion marketing and management. doi: 10.1108/JFMM-10-2020-0217.
- xvii Egels-Zandén N, Hulthén K, Wulff G. (2015) Trade-offs in supply chain transparency / the case of Nudie Jeans Co, Journal of Cleaner Production
- xviii Planet Tracker "Traceable Returns", <https://planet-tracker.org/wp-content/uploads/2021/08/5.-Traceable>Returns.pdf>
- xix Agrawal, T.K.; Pal, R. Traceability in Textile and Clothing Supply Chains: Classifying Implementation Factors and Information Sets via Delphi Study. Sustainability 2019, 11, 1698. <https://www.mdpi.com/2071-1050/11/6/1698>
- xx Seara, J. et al. (2018) Sustainability Is Good Business for Fashion. <https://www.bcg.com/publications/2018/sustainability-good-business-fashion>
- xxi Saenz, H. et al. (2020) How to Trace a Path to Resilient, Sustainable Supply Chains. <https://www.bain.com/insights/resilient-sustainable-supply-chains/>
- xxii Moving the Needle, Threading a sustainable future for apparel (2021), KPMG and Serai. <https://www.seraitrade.com/reports/moving-the-needle>
- xxiii The Benefits of Transparency: A business case for the apparel & footwear supply chain transparency pledge. <https://static1.squarespace.com/static/583f3fc725e25fc45aa446/t/5cdc79bcbb30c30001e27f04/1557952957348/ICAR+-+Business+Case+for+Transparency-single-pages.pdf>
- xxiv Fashion Revolution. (2021) *Fashion Transparency Index 2021*.
- xxv Business of Fashion. (2021) *The BoF Sustainability Index*.



- xxvi https://ec.europa.eu/environment/strategy/textiles-strategy_en#ecl-inpage-1911
- xxvii https://ec.europa.eu/info/sites/default/files/1_1_183885_prop_dir_susta_en.pdf
- xxviii Medcalfe, S. and Miralles Miro, E. (2021) 'Sustainable practices and financial performance in fashion firms', Journal of fashion marketing and management. doi: 10.1108/JFMM-10-2020-0217
- xxix Moving the Needle, Threading a sustainable future for apparel (2021), KPMG and Serai. <https://www.seraitrade.com/reports/moving-the-needle>
- xxx Companies interviewed for this guide did not reveal specific financial measures that demonstrated the ROI on traceability; however, the perspective of those involved in traceability for some time was that it does pay off in the long run. BSR & UN Global Compact (2014) A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains. https://www.bsr.org/reports/BSR_UNGC_Guide_to_Traceability.pdf
- xxxi Cousins, P. et al. (2019) Investigating green supply chain management practices and performance: The moderating roles of supply chain ecocentricity and traceability. <https://www.emerald.com/insight/content/doi/10.1108/IJOPM-11-2018-0676/full/html>
- xxxvii Planet Tracker (2022).
- xxxiii BSR & UN Global Compact (2014) A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains. https://www.bsr.org/reports/BSR_UNGC_Guide_to_Traceability.pdf
- xxxiv McKinsey report (2019) Fashion's new must-have: sustainable sourcing at scale. <https://www.mckinsey.com/industries/retail/our-insights/fashions-new-must-have-sustainable-sourcing-at-scale>
- xxxv Kumar, V. et al. (2017) Contribution of traceability towards attaining sustainability in the textile sector. <https://textclothsustain.springeropen.com/articles/10.1186/s40689-017-0027-8>
- xxxvi PricewaterhouseCoopers. (2018) Closing the loop – the circular economy, what it means and what it can do for you. <https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf>
- xxxvii Saenz, H. et al. (2020) How to Trace a Path to Resilient, Sustainable Supply Chains. <https://www.bain.com/insights/resilient-sustainable-supply-chains>
- xxxviii <https://www.businessoffashion.com/reports/sustainability/measuring-fashions-sustainability-gap-download-the-report-now>
- xxxix <https://planet-tracker.org/second-hand-ipos-the-slow-down-of-fast-fashion>
- xl Fashion for Good. (2021) From fibre to finish: Tracing sustainable viscose. https://fashionforgood.com/our_news/from-fibre-to-finish-tracing-sustainable-viscose/
- xli See slide 17 (initiatives such as 2025 Sustainable Cotton Challenge, Cotton 2040, Organic Cotton Accelerator): <http://cottonupguide.org/wp-content/uploads/2018/06/The-Business-Case-for-Sustainable-Cotton-Business-Benefits-FINAL.pdf>
- xlii See <https://textileexchange.org/standards/> for additional standards
- xliii Segregation and mass balance are explained in more detail, https://unece.org/sites/default/files/2021-03/BRS-Traceability-Transparency-TextileLeather-Part1-HLPDM_v1.pdf
- xliv Innovation Forum. (2021) Sustainable Apparel Barometer 2021. https://innovationforum.s3.amazonaws.com/uploads/spina/attachment/file/1062/Sustainable_Apparel_Barometer.pdf
- xlv UK Modern Slavery Act, <https://www.legislation.gov.uk/ukpga/2015/30/notes>
- xlii <https://www.assent.com/blog/bounty-hunters-target-products-with-dirty-dozen-substances>
- xlvii <https://www.sgs.com/~media/Global/Documents/White%20Papers/sgs-consumer-products-testing-prop-65-sl-whitepaper-en-12.ashx>





ABOUT PLANET TRACKER

Planet Tracker is an award-winning non-profit financial think tank aligning capital markets with planetary boundaries. Created with the vision of a financial system that is fully aligned with a net-zero, resilient, nature positive and just economy well before 2050, Planet Tracker generates breakthrough analytics that reveal both the role of capital markets in the degradation of our ecosystem and show the opportunities of transitioning to a zero-carbon, nature positive economy.

TEXTILES TRACKER

Textiles Tracker investigates the impact that financial institutions have in funding publicly listed companies across the Textiles, Apparel & Clothing sector.

Fast Fashion has created cheap and abundant clothing globally, but the natural capital cost has been high, with toxic production practices, degradation of natural resources, massive and growing waste as well as labour injustice. By providing information and analysis on these problems, placing a value on them and quantifying the negative impact on profits and investor returns, Textiles Tracker will support and stimulate a transition to greater sustainability in the industry. Textiles Tracker identifies the nodes in the textiles supply chain that are creating the greatest damage, analyses their financial value, provides transparency of ownership and, through owners and investors, pressures for change in industry practices.

In this report, we discuss how full supply chain traceability should be a non-negotiable for investors in textile, apparel and luxury goods companies.

Textiles Tracker is a part of the wider Planet Tracker Group of Initiatives.

ACKNOWLEDGEMENTS

Authors: Catherine Tubb, Giorgio Cozzolini

Planet Tracker would like to thank Archie Cage, Rian Cook and Angela Noland for their invaluable contribution. Also, we would like to acknowledge and thank the input of those who reviewed draft papers. We would like to especially thank Peter Needle and his team at Segura for their data input and assistance during this project.

WITH THANKS TO OUR FUNDERS

Laudes
—
Foundation

H&M FOUNDATION

For further information, please contact:

Nicole Kozlowski
Head of Engagement, Planet Tracker
nicole@planet-tracker.org



www.planet-tracker.org #planet_tracker

