

Advancing Responsible Recycled Plastics Value Chains Through Traceability and Transparency

Learnings from the Responsible Sourcing Initiative

September 2026

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BACKGROUND

Traceability is increasingly recognized as an integral building block of responsible sourcing, circular economy systems, and supply chain transparency. Inadequate traceability in plastics recycling poses significant risks to brands and companies, including reputational damage and loss of consumer trust. It also limits their ability to meet both global and local compliance requirements, as transparency is becoming a core expectation under evolving trade and regulatory frameworks.

The Circulate Initiative's [Responsible Sourcing Initiative](#) (RSI) engages with all stakeholders across the recycling value chain to advance responsible sourcing practices that respect human rights and strengthen circularity. To establish a unified and actionable pathway to implement responsible sourcing in the recycling value chain, we developed the [Harmonized Responsible Sourcing Framework for Recycled Materials](#) (Harmonized Framework). Developed through a participatory process with inputs from all key stakeholders, the Harmonized Framework defines a standardized set of themes and indicators to

systematically track and assess human rights conditions across the full value chain.

Strengthening traceability and transparency across material flows and social standards is central to the RSI. By improving visibility across the supply chain, traceability helps recyclers understand where materials come from, identify human rights and environmental risks, and build more responsible and resilient value chains. Through its implementation projects, the RSI has worked alongside recyclers and their supply chain partners to build and strengthen traceability systems that improve visibility into material flows while integrating social compliance considerations.

Building on these implementation experiences in multiple emerging markets, this insights paper captures key lessons from selected recycling value chains, explores common challenges in implementing traceability, and highlights practical approaches that are both credible and operationally feasible.

Traceability in Fragmented Recycling Value Chains

The International Organization for Standardization (ISO) defines traceability as the ability to identify and trace the history, distribution, location, and application of products, parts, and materials. However, in the context of sustainability, “traceability is the ability to identify and trace the history, distribution, location and application of products, parts and materials, to ensure the reliability of sustainability claims, in the areas of human rights, labour (including health and safety), the environment and anti-corruption.”¹

Within recycling value chains, traceability is often perceived primarily as a technological solution; in practice, however, it is far more complex. Effective traceability extends beyond material provenance and transactional data to include visibility into environmental performance and social and ethical conditions across the value chain. Traceability requires navigating highly fragmented and multi-layered systems, where materials pass through several intermediaries before reaching recyclers.

Recycling value chains often rely on informal actors who play a critical role in material collection and sorting. This makes end-to-end traceability challenging, both for tracking material flows and for understanding human rights and labor conditions. Yet expectations are rising, with regulators, certification frameworks, brands, and investors demanding greater transparency and evidence of responsible sourcing.

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¹ Business for Social Responsibility (BSR) and United Nations Global Compact (UNGC). (2014). A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains [online]. Available from: https://www.bsr.org/reports/BSR_UNGC_Guide_to_Traceability.pdf (accessed April 14, 2026)

Insights from Piloting Traceability in RSI Implementation Projects

Designing traceability systems that function effectively requires a grounded understanding of how recycling value chains operate in practice and the incentives that shape behavior across different actors. In the recycling sector, full value chain traceability and transparency remain at a nascent stage.

Approach and Process

The RSI adopted a structured, step-by-step approach to pilot traceability in selected recycling value chains covered by the implementation projects, with a focus on identifying what works in practice and how systems can be implemented effectively across different contexts. Through the implementation projects, the RSI is piloting different tools and approaches to gather practical insights and demonstrate what effective traceability can look like in real-world settings.

- ▶ The process began with a traceability landscape assessment, which included a desk review of over 40 tools and a series of in-depth interviews. This helped identify key drivers and barriers to implementing traceability, particularly for tracking human rights indicators across plastics and other supply chains.
- ▶ Based on these insights, a shortlist of traceability tools with the potential to track both material flows and social indicators was developed. The final selection was made in consultation with an expert working group, resulting in the identification of two tools: BanQu and CleanHub, for pilot implementation in Viet Nam and Indonesia.
- ▶ Following the selection, the RSI worked closely with the tool providers to adapt these solutions and align them with the Harmonized Framework indicators, ensuring that both material and social dimensions were captured.
- ▶ This was followed by pilot implementation, where context-specific use cases were designed across selected geographies. Project partners and tool users were trained, and the tools were subsequently rolled out in the field to test their practical application.

Key Learnings

The pilots represented the fragmented and highly informal value chains commonly observed across many emerging markets. Evidence from pilot implementations shows that challenges to traceability are not primarily technological, but are driven by structural, operational, and behavioral constraints across different actors in the value chain. The key learnings from the pilot are presented below.

Barriers to successful implementation of traceability systems

Evidence from the pilots identified two broad categories of barriers that continue to constrain the adoption and scaling of traceability systems across recycling value chains. These include limited incentives for participation, particularly among upstream actors, and operational and data governance constraints that affect the practical implementation of traceability systems.

Misaligned and insufficient incentives limit traceability adoption

A key barrier to traceability across recycling value chains is the absence of clear incentives for all actors, particularly informal actors operating at lower tiers.

Across recyclers, aggregators, and waste pickers, traceability is often perceived as a compliance requirement rather than a value-adding business function. For upstream actors – such as small aggregators and waste pickers – there are limited direct financial or operational benefits associated with participation. While they are expected to provide data that enables traceability for actors further up the value chain, they rarely receive corresponding incentives in return. Without visible benefits, such as improved prices, stronger buyer relationships, or access to services, traceability requirements are often seen as an additional administrative burden rather than an opportunity to create value.

This challenge is further compounded by the relatively low economic value of many recycled materials. Thin margins across the value chain make it difficult to absorb additional costs or invest time in traceability-related activities for small aggregators and junk shops, reducing the overall incentive to participate.

This challenge is reflected in on-the-ground perspectives. As one small aggregator in Tangerang, Indonesia, noted:

“I don’t want a headache. I just want the business processes to remain simple. If I’m forced to use something like that by my buyer, I’ll just sell my materials elsewhere.”

At the same time, incentive misalignment extends to formal businesses such as recyclers and large processors. While traceability is widely referenced in sustainability commitments, certification schemes, and policy discussions, these expectations often do not translate into consistent demand or a price premium from buyers.



Operational and data governance constraints challenge effective implementation

Implementation is particularly challenging among informal actors in recycling value chains, including small aggregators and waste pickers. Traceability systems require these actors to record and share information on transactions and suppliers, typically through digital systems. However, small aggregators and junk shops that buy materials from waste pickers often operate with limited infrastructure, including the absence of digital weighing and recording systems, smartphones, reliable internet connectivity, and structured record-keeping practices. Transactions are frequently cash-based and recorded manually.

A small aggregator (Tier 3) in Bekasi, Indonesia, described the challenge in greater detail:

“I am not interested at all in adopting the [traceability] system. No one here would really understand it. It’s only my husband and me managing the place, while the workers just help with sorting. The sellers here are mostly elderly—even for transactions, I have to pay in cash because the waste pickers refuse digital transfers. If the system becomes more complicated, the sellers may stop supplying, and that could reduce the volume.”

Operational constraints are further compounded by concerns around data governance. Transaction data in recycling value chains is commercially sensitive, often reflecting pricing structures, supplier relationships, and long-established commercial networks. Pilot experiences highlighted strong concerns among recyclers about sharing data through third-party traceability platforms, particularly where platform providers also operated within the waste management sector, creating perceived conflicts of interest. Even where legal safeguards were in place, perceptions of commercial risk remained high.

Concerns around data privacy, ownership, and control limit the adoption of third-party tools. In addition, limited trust and competition between different value chain actors continue to restrict upstream data sharing and visibility. These findings highlight that successful traceability implementation depends not only on appropriate technology but also on systems that reflect operational realities while establishing trusted approaches to data governance.



Photos: A small aggregator facility where materials are traded in an open buying area using manual weighing equipment and minimal infrastructure. Facilities of this type are common in recycling value chains in emerging markets and illustrate the operational realities within which traceability systems must function. RSI field observation, Indonesia.

Strategies for Successful Implementation of Traceability Systems

While the barriers identified through the pilots are significant, implementation experience also highlighted practical approaches that can improve the adoption and scalability of traceability systems. The following learnings emerged consistently across the pilot implementation.

Embed traceability within business processes and systems

Traceability is most effective when it is integrated into existing business processes rather than introduced as a standalone reporting requirement. This can include building traceability into procurement processes, supplier management, accounting, and inventory systems, enabling traceability to become part of routine operations.

Supporting this integration requires tools and processes that are aligned with existing business practices and appropriate to an organization's level of digital maturity. Targeted capacity-building, simplified and interoperable tools, and phased implementation approaches can help organizations progressively strengthen their traceability capabilities.

A relevant example from Brazil illustrates how traceability can be embedded within broader operational and commercial systems. Green Mining, an environmental services and circular economy company, operates Factory-Price Stations (FPSs), where waste pickers sell collected materials. Material and social data are integrated into operations through a proprietary platform that uses blockchain, georeferenced data, and photographic records to support end-to-end traceability and compliance with labor and environmental standards.²

Create meaningful incentives to support long-term integration of traceability

Meaningful incentives are important for sustaining participation in traceability systems, particularly among upstream actors. These can include direct financial incentives, additional rewards, access to services and technical assistance, improved operational efficiency, stronger buyer relationships, and enhanced market opportunities for traceable recycled materials.

The model developed by Mr. Green Africa in Kenya provides an example of how such incentives can be built into a traceability system. The recycling company provides waste pickers with payments through cash or mobile money, alongside additional rewards through “green points” that can be redeemed for benefits such as food, utilities, and safety equipment. At the same time, its traceability system provides brands with end-to-end information on material and social impacts, creating value for downstream buyers through greater visibility.²

While there is no single proven incentive model for recycling value chains, the RSI continues to test different approaches through its implementation projects to better understand which combinations of financial, operational, technical, and market-based incentives are most effective in encouraging sustained participation across the value chain.

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² World Economic Forum. (2025). Scaling Traceability Innovation to Unlock the Value of Informal Waste Management [online]. Available from: https://www3.weforum.org/docs/WEF_Scaling_Traceability_Innovation_to_Unlock_the_Value_of_Informal_Waste_Management_2025 (accessed April 14, 2026)

Pathways to Designing Successful Traceability Systems

Effective traceability in recycling value chains is not a one-size-fits-all solution. Insights from the RSI projects highlight three practical pathways for implementation: strengthening existing documentation systems, adopting third-party traceability platforms, and developing in-house traceability systems. Each pathway responds to different operational realities and stages of organizational maturity.

Early-stage initiatives and enterprises often benefit from strengthening existing documentation practices to build visibility and establish the foundations for traceability without introducing unnecessary complexity. As operations mature and multiple supply chain partners become involved, third-party traceability platforms can support greater standardization, coordination, and data sharing.

Over the longer term, organizations with more advanced capabilities may choose to develop in-house traceability systems that integrate traceability within core business operations and provide greater flexibility, control, and customization.

The framework below provides a practical decision-support tool to help organizations determine which implementation pathway is most appropriate based on their operational context, existing systems, technical capacity, resource availability, and long-term objectives. Rather than prescribing a single solution, it reinforces that effective traceability is a progressive journey that should evolve alongside organizational maturity and business needs.

A Practical Decision Framework for Traceability Implementation

Decision Criteria	Strengthen Existing Documentation	Third-Party Traceability Systems	In-House Traceability Systems
Stage of journey	Early stage/pilots/informal systems	Scaling phase/multi-partner systems	Mature program/long-term
Existing systems	Paper-based or basic digital records	Some digital tools are already used	Existing internal digital systems
Market demand for traceability	Low or emerging	Medium to high	Medium to high with tailored reporting
Team capability	Limited technical capacity	Moderate capacity with vendor support	Strong internal technical capacity
Data sharing preferences	High sensitivity; prefer local control	Comfortable sharing data with an external platform	Preference for full internal control
Cost and resources	Very limited budget	Budget available for licenses and onboarding	Budget available for build, maintenance, and upgrades
Best fit when	Focus is learning, visibility, and readiness	Rapid standardization and scaling across partners	Traceability is a strategic, long-term investment embedded in core operations

Way Forward

Scaling traceability across recycling value chains will require coordinated action from industry, governments, brands, recyclers, investors, technology providers, and sector initiatives. While technology is an important enabler, successful implementation depends on creating appropriate incentives, strengthening organizational capacity, and designing systems that reflect the operational realities of recycling value chains. Developing effective incentive models that combine commercial value, operational efficiencies, stronger buyer relationships, access to finance, technical assistance, and greater market recognition for responsibly sourced recycled materials will be essential to achieving sustained participation and long-term adoption.

Capacity-building and technical assistance remain equally important. Organizations require support not only to adopt digital tools, but also to strengthen supplier management, improve data quality, integrate traceability into existing operational systems, and progressively implement responsible sourcing practices. Approaches that build on existing business processes and reflect the capacities of different actors are more likely to achieve sustained adoption than solutions that introduce additional complexity or administrative burden.

The Harmonized Framework supports this transition by establishing common standards for responsible sourcing and standardizing key social indicators alongside material traceability, creating a shared global language for responsible sourcing in the recycling sector. Under RSI implementation projects, these principles are further operationalized through Supplier Management Programs, supporting structured, progressive, and scalable adoption while strengthening responsible sourcing practices across supply chains.

As these implementation efforts continue, there remains a significant opportunity to build the evidence base on what works to scale traceability across diverse recycling value chains. Through ongoing pilot implementation, the RSI will continue to test and refine practical approaches, generate implementation evidence, and share lessons with the broader sector. These learnings can help inform future investments, strengthen industry practice, and support the development of traceability systems that are not only technically robust but also commercially viable, socially inclusive, and scalable.





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