FICHE 02 / 10

Why Recycling Systems Fail in Emerging Markets

Infrastructure alone doesn’t close the loop.
Here’s where plastic leaks — and what stops it.

IN THIS FICHE

#CircularEconomy · #EPR · #EmergingMarkets · #FMCG · #WasteManagement

EPR Managers | Sustainability Teams | FMCG Distributors | PRO Directors

Clément Chabot — Founder, Play for Earth

A Play for Earth initiative · Nairobi, Kenya · 2026

KEY INSIGHTS

1. Recovery failure in emerging markets is primarily a coordination failure, not an infrastructure failure. The handoff between actors - not the absence of bins or sorting centres - is where materials leak.[1,2]

2. Informal collectors already perform the majority of material recovery in most emerging markets. They are effective assets when coordinated. Uncoordinated, they optimise individually and leave territorial gaps.[3,4]

3. The verified behavioral data needed for EPR compliance and Scope 3 Category 12 already exists inside FMCG distribution networks. It has not yet been activated for reverse logistics.[5]

1. THE SCALE OF THE PROBLEM

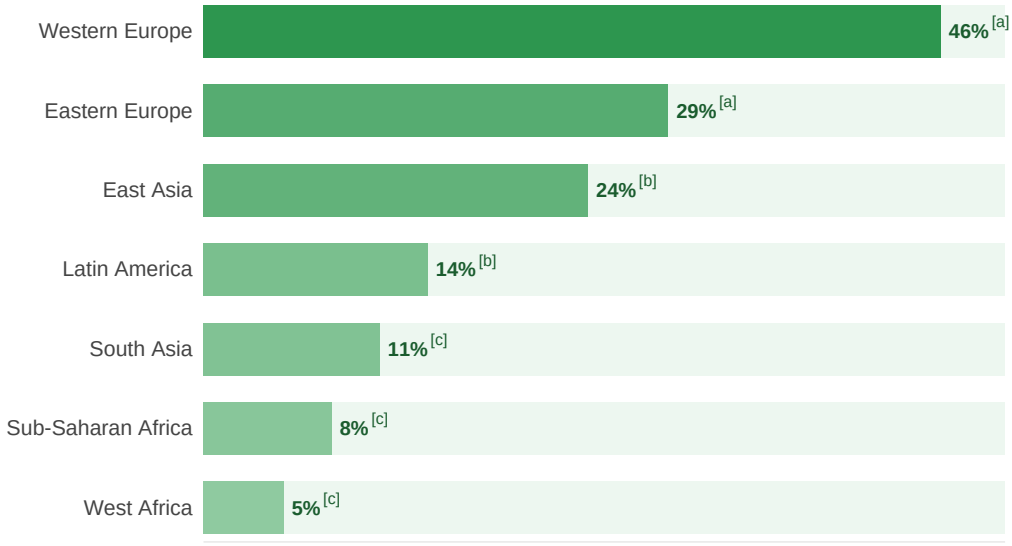
Plastic waste management remains one of the most persistently under-solved challenges in environmental governance. Global plastic production exceeded **400 million tonnes** in 2022, with **less than 10 percent formally recycled** worldwide.[1] In Sub-Saharan Africa, South Asia, and parts of Southeast Asia, formal recovery rates for post-consumer plastic packaging remain below 10 percent - and in many markets, well below 5 percent.[2,3]

These are not marginal failure rates. They represent a **structural gap** between the policy ambitions embedded in extended producer responsibility frameworks and the operational reality on the ground. More than 60 countries now have some form of EPR legislation for packaging.[7] The majority of those frameworks, particularly across the Global South, report compliance against **estimated recovery figures** - not verified event-level data.[2,6]

THE SCALE OF THE PROBLEM

400M t	**< 10%**	**60+**
Plastic produced globally in 2022[1] - less than 10% formally recycled	Formal PET recovery rate in most SSA markets[2,3]	Countries with active EPR legislation for packaging[7]

Formal PET Recovery Rate by Region (%)



[a] Plastics Europe (2023) [b] UNEP (2023) [c] World Bank (2022) - estimates, formal recovery only

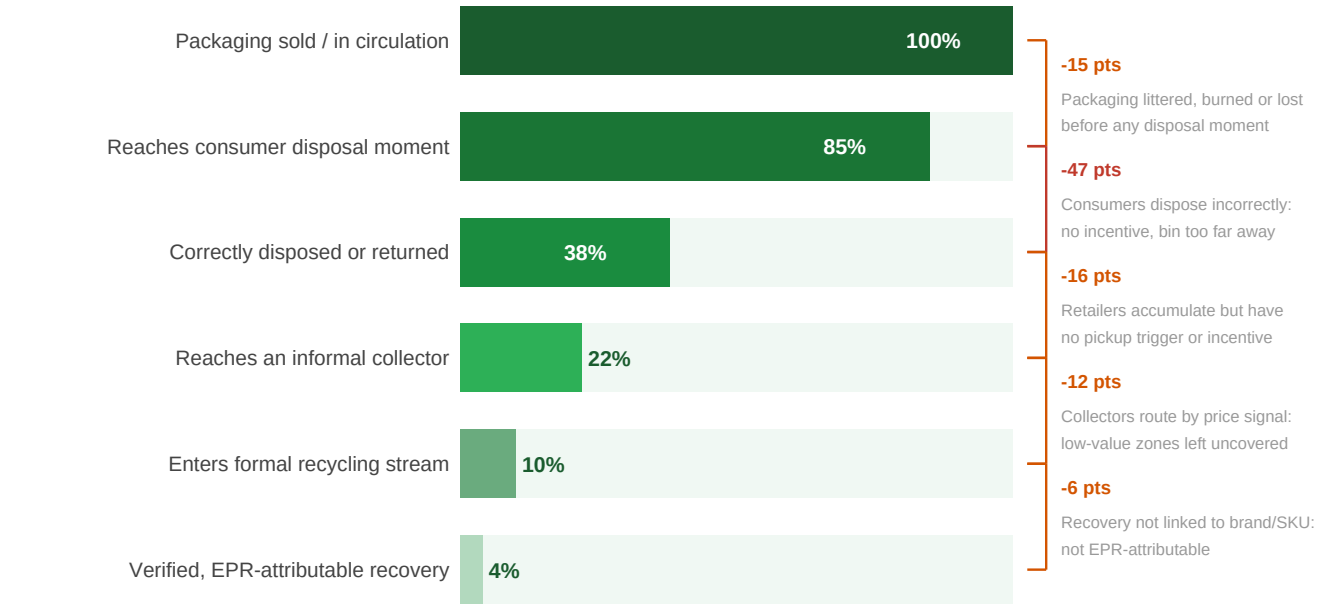
The recovery gap is not uniform. Western Europe, with 30 years of EPR legislation and dense formal infrastructure, achieves formal recovery rates of 40 to 50 percent for PET.[a] Sub-Saharan Africa, operating with newer EPR frameworks and high informal sector dependence, sits at 5 to 10 percent.[2,3] The gap is real. But the conventional diagnosis - that emerging markets simply need the infrastructure Europe has built - misreads where the constraint actually sits.

In most cases, infrastructure is not the primary constraint. Coordination is.

2. WHERE PLASTIC ACTUALLY LEAKS

Academic and practitioner analysis of emerging market recovery systems consistently identifies the same structural pattern: materials fail to be recovered not because there is nowhere to take them, but because the handoff between successive actors in the recovery chain is uncoordinated, unverified, and unincentivised at the critical moment.[2,3,4]

Where Packaging Leaks: The Recovery Chain



Illustrative model. UNEP (2023), World Bank (2022), Wilson et al. (2006). SSA indicative.

The sharpest drop-offs occur at two points: the consumer disposal moment (where convenience and proximity to correct disposal options are absent) and the retail-to-collector handoff (where materials accumulate without a verified pickup trigger). By the time packaging reaches a formal recycling stream, an estimated 90 percent of what was sold has already leaked out of the recovery system.[2,3]

LEAK POINT	ROOT CAUSE	WHY STANDARD PROGRAMMES MISS IT
Consumer disposal	No economic incentive; no proximity to a correct disposal option.	Awareness campaigns assume a knowledge gap. The gap is friction and proximity.
Retail accumulation	Shopkeepers receive returns but have no system, no partner, no value signal.	Retail is treated as forward logistics only. Reverse logistics potential is not activated.
Collector routing	Collectors follow price signals, not territorial coverage. Low-value areas leak consistently.	Programmes formalise collectors but do not coordinate routing. Individual optimisation persists.
Aggregation handoff	Materials accumulate without a verified pickup trigger or recorded handover.	No verified handover = no auditable data. EPR claims rest on estimates.

3. THE COORDINATION FAILURE: A STRUCTURAL DIAGNOSIS

The concept of **coordination failure** - drawn from institutional economics - describes situations where individually rational behaviour by multiple actors produces collectively suboptimal outcomes.[8] Recovery systems in emerging markets exhibit this pattern almost universally.

The consumer disposes conveniently because no incentive exists to do otherwise. The retailer accumulates packaging because **no pickup trigger exists**. The informal collector routes to the highest-value area because **no territorial assignment exists**. No single actor is behaving irrationally. **The system design is what fails.**

This diagnosis determines what kind of intervention works. Coordination failures are not solved by adding more physical assets to a system where existing assets are already underutilised. They are solved by establishing **information flows, incentive structures, and verification mechanisms** that allow actors to coordinate around a shared recovery logic.

> *"The informal economy is not the problem. Uncoordinated informality is the problem."*

4. THE INFORMAL SECTOR: ASSET, NOT LIABILITY

The research literature on informal waste picking is unambiguous: **informal collectors are the backbone of material recovery** in the Global South. Wilson et al. (2006) estimate that the informal sector recovers between **50 and 80 percent** of recyclable material entering recovery streams in many documented cities across low and middle income countries.[3] Kaza et al. (2018) confirm this pattern across 68 countries.[4]

The informal sector's operational advantage is **reach and speed**. Informal collectors enter markets faster than formal systems, cover areas that formal infrastructure cannot economically justify, and respond to price signals with flexibility that centralised collection cannot match.

The structural weakness emerges at the system level. Without territorial assignments, collectors cluster around high-value material flows and **leave lower-density areas systematically uncovered**.[3] Without **verified weigh-in records**, their recovery cannot be attributed to specific producers for EPR compliance purposes.[6]

The policy implication is precise: the intervention is not to replace informal collectors with formal systems. It is to **coordinate them** - through territory assignments, guaranteed offtake pricing, and verified handover records - in a way that makes their existing effort EPR-attributable and audit-ready.

5. RETAIL AS THE MISSING RECOVERY NODE

Of all the underutilised nodes in the recovery chain, the informal retail point may represent **one of the most underutilised coordination nodes** in the recovery chain. In East Africa alone, the informal retail sector comprises an estimated 2.5 million outlets.[5] Each outlet receives packaged goods daily, interacts with consumers at the point of consumption, and handles post-consumer packaging informally - accumulating it, disposing of it in general waste, or occasionally sorting it for informal collector pickup.

The retail point sits at the intersection of three relationships that matter for recovery: it receives stock from distributors on regular, predictable routes; it generates post-consumer packaging through consumer traffic; and it interacts with informal collectors who visit ad hoc. All three relationships exist. None have been activated for recovery coordination.

Transformation from passive accumulation site to active recovery node requires three conditions: an economic incentive to aggregate correctly, a simple sorting protocol embedded in an existing routine, and a verified pickup trigger that creates accountability at the handover moment. When these three conditions are present, the retail point does not need new infrastructure. It needs activation.

"The infrastructure for recovery already exists inside the distribution system. It simply needs activation."

6. THE DISTRIBUTION NETWORK AS RECOVERY INFRASTRUCTURE

Large FMCG companies operating in emerging markets fund dense distribution networks: national distributors, regional sub-distributors, and last-mile representatives visiting hundreds of retail points per week.[5] This network was built for forward logistics. It generates, as a structural by-product, the most systematic physical presence in informal retail that exists in these markets.

Every distributor route visit is a moment when packaging condition can be observed, sorting confirmed, and a verified handover event recorded - without additional headcount, without new vehicle movement, and at a marginal time cost estimated at under 30 seconds per retail stop, based on Play for Earth field operations data.[10]

STEP	ACTION	OUTPUT
1 Deliver	Rep delivers stock on existing route. No new visit required.	Standard delivery completed.
2 Photograph	Rep photographs packaging condition and sorted materials. AI validates for material type and sorting quality.	Verified recovery event: photo + geo + timestamp + retailer ID.
3 Trigger	If volume threshold is met, platform schedules verified collector pickup within 48 hours automatically.	Collector routing coordinated without additional overhead.
4 Report	Event maps to EPR compliance and Scope 3 Category 12. Full provenance chain available to external auditors.	Auditable recovery data — not an invoice-derived estimate.

The cost structure is fundamentally different from alternative approaches. Deposit return systems require physical infrastructure at every collection point. IoT sensor networks require deployment and connectivity. Third-party audits require dedicated programmes. Distribution-embedded activation requires none of these. It adds a verification layer to what already happens, rather than building a parallel system alongside it.

CONCRETE EXAMPLE: KENYA

In Kenya, major beverage distributors already visit informal retail points weekly across Nairobi, Mombasa, and secondary towns — covering tens of thousands of outlets on pre-funded routes. These same reps manage stock audits, promotional compliance, and competitor checks at each stop.

Embedding a PET verification step into this existing visit — one photo of sorted packaging at the point of handover, automatically geo-tagged and timestamped — creates a traceable recovery event without adding a new logistics route, a new vehicle movement, or a new field role. The coordination already happens. The verification layer is the only addition.

7. BEHAVIORAL RECOVERY DATA: A NEW DATA CATEGORY

Most EPR compliance reporting and Scope 3 Category 12 disclosure rests on data derived from economic transactions: waste contractor invoices, PRO tonnage aggregates, spend-based emission factors. These sources describe economic flows. They do not describe physical recovery events.

A waste contractor invoice does not confirm that a specific retailer's packaging was separately collected, correctly sorted, and processed by an eligible recycler. A PRO tonnage report does not attribute recovery to specific producer brands or specific geographic territories. The data is real. The attribution is estimated.

CONCEPT: BEHAVIORAL RECOVERY DATA

Sustainability metrics derived from **verified real-world recovery actions** - not estimated from economic proxies. Each data point is generated at the point of recovery: a photo taken by the field agent confirming packaging condition and handover at a specific retail location. Each event carries a specific actor, location, timestamp, and material category - making it **traceable, auditable, and EPR-regulation-ready**.

Examples of verified recovery events:

- Sales rep photographs sorted PET at retail point during weekly route visit - photo + geo + retailer ID + material type
- Informal collector completes verified weigh-in at aggregation point - photo + timestamp + declared weight
- Retailer confirms packaging return at distributor drop-off - barcode scan + GPS location
- Verified recovery event feeds retailer's Green Transformation Index (GTI) stage progression - from Compliant to Engaged

Feature	Traditional EPR Reporting Data	Behavioral Recovery Data
Source	Contractor invoices, PRO tonnage aggregates	Verified photos, field actions at retail level
Verification	Invoice-level — no event-level proof	Photo + Retailer ID + Geo + Timestamp
Attribution	PRO-level aggregate, not brand or territory specific	Actor + location + brand + material category
Auditability	Low — estimated totals	High — full provenance chain per event
Reporting frequency	Quarterly or annual	Real-time — per route visit
Regulatory resilience	Vulnerable to audit challenge under CSRD / IFRS S2	Designed to meet ISAE 3000 assurance standards

8. THE REGULATORY DIRECTION OF TRAVEL

EPR frameworks are proliferating and tightening across Sub-Saharan Africa, South and Southeast Asia, and Latin America. Kenya, Ghana, Nigeria, South Africa, Vietnam, and Indonesia have all introduced or significantly strengthened producer responsibility obligations for packaging since 2020.[7] The trajectory is consistent: registration obligations precede recovery obligations, which precede verified reporting obligations.

At the international level, IFRS S1/S2 and the EU Corporate Sustainability Reporting Directive (CSRD - ESRS E1) now explicitly require companies to explain material Scope 3 categories and support them with verifiable data rather than high-level estimates.[8,9] For any FMCG company selling packaged goods at scale, end-of-life treatment is unambiguously material under a double-materiality assessment.

The compliance window for estimated data is narrowing. Early pilots with deposit return systems and digital tracking tools are beginning to generate more granular recovery data in some markets - but verified, actor-level event records remain the exception rather than the rule. A verified recovery dataset built over 24 months becomes a durable compliance asset that invoice-based estimates cannot replicate.

BRAND LENS

EPR compliance is now part of the commercial risk perimeter for any FMCG brand operating in markets with active producer responsibility legislation. Under tightening EPR frameworks in Kenya, South Africa, and Vietnam, brands that cannot demonstrate verified recovery performance face escalating PRO fees, potential levy penalties, and growing exposure in supplier assessment criteria used by major retail chains.

As EPR frameworks introduce performance differentiation — where verified high-performing producers pay lower levy rates — PRO membership becomes a floor, not a ceiling. Brands with verified Behavioral Recovery Data carry a structural cost advantage that compounds over time.

9. TWO OBJECTIONS — AND WHY THEY MISS THE POINT

“We already work with a PRO. Recovery reporting is their responsibility.”	**“Our field teams are already stretched. Adding another step is not realistic.”**
PRO membership satisfies registration requirements. It does not generate event-level recovery data attributable to your specific packaging or territories. PRO tonnage reports aggregate across all members and estimate from waste flow models. Under CSRD and IFRS S2, material Scope 3 Category 12 claims must be traceable to specific actors, locations, and events. As EPR frameworks introduce performance differentiation, PRO membership becomes a compliance floor — not a performance signal. Verified recovery data is what separates high-performing brands from the pool of estimated compliers.	The activation protocol adds under 30 seconds to an existing route visit: one photo per retail stop, taken during the stock audit that already happens. No separate programme, no additional reporting burden, no new field role. Distribution partners who adopt the model gain new revenue from PRO and brand incentive payments tied to verified recovery performance. The incremental time cost is near-zero. The model also generates real-time territory intelligence — recovery rates, GTI stage maps, retailer participation — that distribution managers have never had access to from existing sales reporting systems.

10. GOVERNANCE AND INTEGRATION

Behavioral Recovery Data architecture integrates with existing distributor sales force automation and route management systems - it does not replace them. Integration typically runs via flat-file export or standard API into existing EPR compliance platforms and carbon accounting tools. No core system replacement required.

Governance follows a three-layer model. Field agents capture and submit verified recovery events at the point of action. Territory managers review and approve aggregated event records. EPR compliance and sustainability teams receive audit-ready territory dashboards with full data lineage. External assurance providers can access the complete evidence trail - raw photos, GPS logs, retailer IDs, and verification metadata - designed to meet ISAE 3000 standards.

The Green Transformation Index (GTI) tracks retailer and field agent behavioural progression across five stages: Inactive, Aware, Compliant, Engaged, and Internalized. GTI is a weighted composite of action frequency, streak consistency, sorting accuracy, network depth, and routine integration depth. The distinction between Compliant and Engaged is operationally significant: a Compliant retailer sorts when the rep is present. An Engaged retailer sorts between visits. The GTI measures the difference - and that difference is what EPR auditors are beginning to demand evidence of.

GTI STAGE	BEHAVIOUR PROFILE	WHAT IT MEANS FOR EPR
1 Inactive	No recovery action. Packaging disposed with general waste.	No data generated. Not EPR-attributable.
2 Aware	Sorting attempted occasionally, inconsistently. Prompted by rep.	Partial data. Low confidence. Insufficient for audit.
3 Compliant	Sorts reliably when rep is present. Stops when rep does not visit.	Usable data during active visits. Coverage gaps between routes.
4 Engaged	Sorts between visits. Proactively flags collection needs.	Continuous verified data. Strong EPR attribution.
5 Internalized	Sorting embedded in shop routine. Persists after incentive removal.	Durable behavioral data. Highest EPR and ESG value.

"Compliance is what retailers do when the rep is watching. Internalization is what they do when the rep is not."

CORE INSIGHTS	RECOMMENDATIONS	QUESTIONS TO ASK
✓ Recovery failure is a coordination failure, not an infrastructure gap	→ Map leak points before investing in collection infrastructure	**?** At which point does packaging most frequently leave your recovery system?
✓ Retail is the highest-leverage, most underutilised node in the recovery chain	→ Integrate packaging recovery verification into existing distributor route protocols	**?** What percentage of your EPR recovery data is verified versus estimated?
✓ Distribution networks already contain the infrastructure for verified recovery data	→ Build economic incentives for retailers to aggregate - not awareness campaigns	**?** Do your distributors have visibility on packaging condition at retail level?
✓ Informal collectors are powerful assets when coordinated through structured incentives	→ Price activation by territory, not headcount	**?** Which regulator or investor will challenge your Category 12 disclosure first?

SOURCES AND REFERENCES

[1] UNEP (2023). Turning Off the Tap: How the World Can End Plastic Pollution and Create a Circular Economy. United Nations Environment Programme. unep.org

[2] World Bank (2022). What a Waste 2.0: A Global Snapshot of Solid Waste Management. Urban Development Series. openknowledge.worldbank.org

[3] Wilson D.C. et al. (2006). Role of the Informal Sector in Waste Management in Developing Countries. Waste Management and Research, 24(4), 337–352.

[4] Kaza S. et al. (2018). What a Waste 2.0. World Bank Group. openknowledge.worldbank.org

[5] Nielsen Africa (2022). Emerging Market Retail Census: East Africa Distribution Coverage Report. nielsen.com

[6] GHG Protocol (2013). Technical Guidance for Calculating Scope 3 Emissions — Category 12: End-of-Life Treatment of Sold Products. ghgprotocol.org

[7] UNEP (2022). Global EPR Policy and Programme Tracker: Status of Producer Responsibility Legislation in 60+ Countries. unep.org

[8] European Commission (2022). EU Corporate Sustainability Reporting Directive (CSRD) — ESRS E1. ec.europa.eu

[9] IFRS Foundation (2023). IFRS S1/S2 Climate Disclosure Standards. ifrs.org

[10] Play for Earth (2026). Field Operations Data — 20,000+ verified field actions (field-level; not yet independently verified). Internal dataset.

Suggested citation: Chabot, C. (2026). Why Recycling Systems Fail in Emerging Markets. Play for Earth Insight Series, Fiche 02/10. Play for Earth. playforearth.org

COMING NEXT: FICHE 03/10

From Awareness to Action: Designing Behavioral Sustainability Systems — Campaigns create intention. Systems create habits. The next fiche maps how to build a behavioral system that turns one-off field actions into internalized routines, and why the GTI framework distinguishes compliance from internalization in ways that matter for EPR auditors and ESG investors.