

Module 4: Circular Logistics, Reverse Flows, and Resource Recovery

Module Description:

Module 4 focuses on how logistics systems can move beyond one-way throughput and support more circular models of production, consumption, and recovery. Students examine reverse logistics, returns, collection systems, repair, reuse, remanufacturing, recycling, and resource recovery, and ask what must change for materials and products to circulate rather than simply move forward and become waste. The module treats circular logistics not as a technical add-on, but as a redesign challenge involving infrastructure, incentives, data visibility, coordination, and organizational responsibility.

The key idea of the module is that waste is often a logistics problem as much as a design problem. Products are frequently lost not only because they are poorly made, but because collection is inconvenient, sorting is weak, return channels are unclear, incentives are misaligned, or recovery actors are disconnected from one another. Students therefore learn to view circularity as a logistics question: how do products and materials move back, who handles them, what information is required, and where does value disappear?

This is especially relevant for Vietnam and Southeast Asia, where rapid growth in e-commerce, packaging use, electronics consumption, and urban waste pressure makes reverse flows increasingly important. It also connects strongly to sustainable development, because circular logistics can reduce waste, preserve resources, lower emissions, create new forms of value, and require partnerships across firms, governments, and communities.

Key SDG links:

- **SDG 9** Industry, Innovation and Infrastructure
- **SDG 11** Sustainable Cities and Communities
- **SDG 12** Responsible Consumption and Production
- **SDG 13** Climate Action
- **SDG 17** Partnerships for the Goals

Learning Objectives:

By the end of this module, students should be able to:

- Explain the role of reverse logistics and closed-loop systems in sustainable development.
- Identify where circular systems fail in practice, including collection, sorting, return, recovery, and coordination points.
- Distinguish between circularity claims that are operationally realistic and those that depend on weak or missing logistics systems.
- Evaluate how reverse flows affect waste reduction, resource recovery, emissions, and stakeholder responsibility.

- Analyze the inter-organizational coordination needed for effective circular logistics.
- Communicate an evidence-based proposal for a circular logistics improvement and show how it aligns with relevant SDGs.

Module 4 Pre-class activities

Purpose:

To prepare students to see circularity as a logistics and coordination problem rather than only a recycling slogan. The pre-class work introduces them to the idea that reverse systems need intentional design, information visibility, incentives, and collaboration across multiple actors.

Pre-class Activity 1: Choose one product system

Choose **one** product category where reverse logistics and circularity matter. For example:

- beverage packaging
- consumer electronics
- garments or footwear
- batteries
- furniture
- pharmaceuticals packaging
- e-commerce parcels and returns
- industrial pallets or reusable transport items

Students should create a short reverse-flow audit identifying:

- where the product currently goes after use
- where the loop most likely breaks
- what gets lost, wasted, or contaminated
- which actor has the least incentive to help recover value

Pre-class Activity 2: Short written response

Write 200–250 words total and post to the online class discussion forum before the session.

In your response, identify:

- the biggest obstacle to circularity in your chosen case
- whether the problem is mainly behavioral, operational, financial, infrastructural, or informational
- **two SDGs** that are most relevant to improving the system
- one actor who should take more responsibility
- one reason why a “recyclable” system may still fail in practice

This task is intentionally introductory. Students are not expected to solve the full system yet. The aim is to make visible the frictions that prevent products from looping back effectively.

Module 4 In-class activities

Activity 1: Reverse Logistics Service Blueprint

Goal: Make the reverse journey visible and identify where circular value is lost.

Each group selects one product system and creates a **reverse logistics blueprint** showing:

- the customer or user return point
- collection mechanisms
- consolidation points
- transport to sorting or inspection
- sorting or triage decisions
- repair, reuse, remanufacture, recycling, or disposal options
- information handoffs
- likely failure points

Groups must annotate the blueprint with:

- where material quality declines
- where information is missing
- where customer participation is weakest
- where costs rise sharply
- where the greatest SDG benefit could be created if the flow improved

This activity differs from earlier modules by using a service design logic rather than a trade-off auction or disruption simulation. It helps students visualize circularity as a chain of dependencies.

Output: A Reverse Logistics Blueprint showing the full return pathway, the weakest two points in the system, and one SDG synergy the redesign could strengthen.

Activity 2: Circular Partner Matchmaking: Who Pays, Who Benefits?

Goal: Show that circular logistics depends on ecosystem design, not just one firm's internal decision.

Groups are provided a pool of possible actors, such as:

- brand owner
- retailer
- third-party logistics provider

- municipality
- recycler
- repair business
- refurbishment partner
- digital platform
- informal collector
- customer group
- manufacturer
- packaging recovery organization

Their task is to build the most workable circular partnership model for their case. They must decide:

- who should lead
- who should collect
- who should sort
- who should recover value
- who should pay or incentivize participation
- who must share data

Their partnership model must include a defended incentive decision. They must explain who pays, who receives value, and why each actor would agree to participate. They cannot assign extra work to an actor unless they also explain what they receive in return. This activity intentionally shifts attention from internal process design to partnership and governance. Consider including the following questions:

- Who pays for collection, sorting, transport, or recovery?
- Who receives the recovered value?
- Who needs an incentive to participate?
- What happens if recovery costs more than the material is worth?
- Which actor is most likely to withdraw from the partnership?
- What agreement, policy, fee, or data-sharing mechanism would keep the partnership working?

Output: A one-page Circular Partnership Map showing the proposed actor ecosystem, one major coordination risk, and one reason the partnership supports **SDG17**.

Activity 3: Return Channel Redesign Sprint

Goal: Push students to turn circular ambition into a practical logistics improvement.

Each group must redesign one part of the reverse system for an industry of their choosing. They can focus on:

- improving collection convenience

- reducing contamination
- making returns easier to sort
- increasing repair or reuse potential
- improving incentive design
- adding data visibility or traceability
- reducing unnecessary reverse transport

They are only allowed to change **one stage** of the system, which forces focus and realism.

Groups must explain:

- what exactly they are changing
- why that stage matters most
- what sustainability benefit would likely result
- what trade-off or unintended consequence might appear

This activity helps students avoid vague “make it more circular” thinking and instead work on one high-leverage intervention.

Output: A short Return Channel Redesign Card with one intervention, one likely sustainability gain, one likely implementation challenge, and the SDGs most clearly affected.

Post-class activities

Post-class Reflection: Students respond to the prompt:

“Why is circular logistics as much a coordination and incentive problem as it is a waste problem?”

Students should write a short reflection that includes:

- one circular idea they initially thought was simple but now see as complex
- one actor they now think is more important than they first assumed
- one place where logistics, rather than product design, seems to determine whether circularity works
- one SDG link they now understand more clearly

This reflection matters because it helps students consolidate the central lesson of the module: circular systems fail not only because people do not recycle, but because reverse flows, incentives, infrastructures, and partnerships are often weak or fragmented.