Operations - refill

Introduction to operations

Get ready to explore the key operational considerations for refill systems. Successful implementation and scalability of refill solutions hinge on efficient operations, from inventory management, washing and logistics to end of life management. We will highlight differences between B2B and B2C operations, explore packaging options and traceability requirements, and cover the importance of quality assurance and hygiene standards. You will understand bottlenecks such as stock-outs or misaligned procurement processes and gain practical solutions to address them. By the end, you will understand how to structure responsibilities, anticipate challenges, and establish efficient, reliable operations that build trust with users and partners.

Product sourcing

Product sourcing in refill models refers to the processes, decisions, and strategies involved in acquiring and managing the products that are later sold in refillable containers. It involves ensuring a consistent supply of products while considering sustainability, logistics, and customer demands.

Sourcing products in bulk allows refill providers to purchase large quantities at a discounted price, thereby reducing the overall cost of the product. When planning to buy in bulk you need to consider your storage space (where is this located, how does it flow into your machines, etc) and any specialized equipment required (e.g., bulk containers, dispensing systems).

The products you offer need to be aligned with the dispensing model you've established, expiration timeline and volume to dispense. For example, selling daily amounts of fresh milk is different from a monthly refill of laundry detergent, which differs from an at-home subscription of cleaning product tablets.

Packaging Design

When designing packaging for refill systems, several factors must be considered: **durability** for repeated use, **ease of cleaning and sanitization**, **functional design** for dispensing and refilling, and **clear labeling** for reuse instructions and product identification. Packaging should also be compatible with refill station equipment and logistics. Refill systems can offer their own standardized packaging or users can bring their own (BYOC), depending on the system set-up.

Packaging standardization is key to reducing costs along the supply chain, below are a few examples:

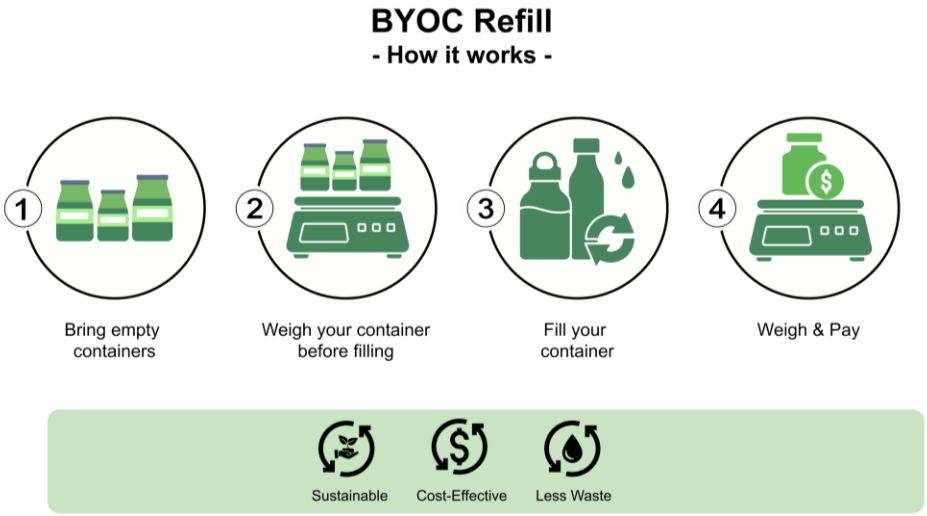
- Reduce space: By nesting/stacking packaging you can save space and transport higher volume.
- Compatibility: fit into existing retail spaces, filling process, etc.
- Ease of use: easy to wash container, change labels, etc.

Packaging Types for Refill Models

When setting up a refill system, it's important to clarify what kind of packaging consumers will use. The choice affects cost, convenience, and customer experience.

1. Bring Your Own Container (BYOC)

- Pros: low business cost, customer flexibility
- Cons: hygiene and compatibility challenges; customers must remember to bring and clean their own



2. Specific Refillable Packaging (provided by the system)

- Unlike return, the container stays with the customer
- Often the first one is given free/low-cost, then customers buy and maintain it
- Pros: standardization, brand visibility, system integration
- Cons: higher business investment, user limited to that packaging, user upkeep responsibility

B2B vs B2C Packaging Nuances

For B2C:

Branded containers (e.g. Lush refill soap bottles)

- BYOC (open-fill suitable, closed-fill not)

For B2B packaging, we are not talking about the consumer's container, but rather the bulk or intermediate containers that a business uses to distribute products to retailers or refill stations, and which are then dispensed into final consumer packaging. Examples include large drums, jerrycans, tanks, or refill cartridges that slot into vending machines or in-store dispensers.

- There are several aspects you will need to understand when selling your refillable product to a business: What type of container will be used?
- Who provides the container?
- Who fills the container?

Unfortunately, no single-metric exists that tells you the specific packaging solutions to use for the best systemic outcome. There will be pros and cons for each solution which you will need to consider. Below is an example of a start-up testing out a new solution.

Respray Solutions, a Hungarian start-up, developed the world's first in-store refill station for spray deodorants. Their system allows customers to refill aluminum cans up to five times using compressed air instead of traditional propellants, significantly reducing carbon emissions. The refillable cans, made from 100% recycled materials including 50% post-consumer recycled content, help lower waste by replacing multiple disposable cans with one durable solution. Installed in stores like Rossmann, the system features a user-friendly touchscreen interface guiding customers through the safe refill process. After five refills, users receive a replacement can. Respray's innovation has won awards like the German Packaging Prize and the World Packaging Organisation's Gold Award, demonstrating its potential to revolutionize sustainable aerosol packaging.

Labeling & traceability

Labeling

Labels must clearly indicate **product name, ingredients, expiration or batch codes, and usage instructions**, especially when containers are reused across different product types. It's essential that labels are **durable**, resistant to water, handling, and repeated washing, or easily replaceable. They must be compliant with local regulations and company standards.

When customers bring their own refillable containers, labeling becomes more complex but remains essential for **product safety, regulatory compliance, and consumer clarity**. In these cases, labeling typically needs to be applied **at the point of refill**, often in the form of:

1. **Temporary stickers or printed labels** – Applied during the refill process to show product name, ingredients, allergens, batch number, and fill date.

2. **Receipts with product info** – Provided at checkout with necessary labeling details, especially for dry goods or non-perishable items.

3. **Digital labeling via apps or QR codes** – Customers scan a station QR code to store product information digitally linked to their purchase.

Traceability

For traceability, systems often use **QR codes, barcodes, or RFID tags** to track the container's lifecycle, including filling, cleaning, and reuse history. This is especially important for food, personal care, and pharmaceutical products, where hygiene and regulatory compliance are paramount. Digital traceability can also support loyalty programs or deposit-return systems by linking containers to user profiles or transactions.

In the end of the day, traceability will support the data reporting and compliance to upcoming regulations, ensuring that businesses are reducing packaging waste at the amount required (or beyond!)

Examples of technologies supporting traceability:

- QR/RFID Tags
- IoT Sensors (for smart refill stations or containers)
- Cloud-based Data Management Systems
- Mobile Apps for Consumer Scanning and Engagement
- Blockchain (in high-transparency or multi-party systems)

Benefits of Traceability

- **Regulatory Compliance and Health & Safety**: Traceability ensures products meet packaging and safety regulations by accurately tracking product batches for quality assurance, recall readiness, and legal compliance, critical for food, personal care, and cleaning products.
- **Understanding Consumer Refill Behavior:** Collect data on refill frequency and patterns to optimize inventory management, improve demand forecasting, and tailor marketing efforts based on customer insights.
- **Reverse Logistics Oversight:** In closed-loop systems, traceability ensures proper return, cleaning, and reuse of refillable containers, maintaining system integrity and hygiene.
- **Measuring Environmental Impact:** Access to detailed usage data enables precise metrics on packaging waste diversion and related CO2 emission reductions, reinforcing sustainability claims and reporting.

Quality is a cornerstone of any successful refill system. Consumers must trust that the product they purchase through a refill station is identical in quality, safety, and performance to the one they would get in traditional single-use packaging. Any inconsistency, whether in formulation, appearance, or user experience, can damage trust and slow adoption.

Ensuring quality in refill systems starts with the **supply chain**. Products should be transported, stored, and dispensed in ways that maintain their integrity. This may require bulk packaging with protective

barriers, temperature control, or dedicated handling procedures. Refill stations must be designed to avoid contamination, prevent product degradation, and comply with all relevant hygiene and safety regulations.

Cleaning and maintenance protocols are equally important. Dispensers and refill equipment should be regularly cleaned, calibrated, and inspected. Staff training is key to ensuring these processes are followed consistently. For food or personal care products, compliance with local health regulations is non-negotiable, and documented cleaning schedules can be a legal requirement.

Quality also extends to the **user experience**. Smooth dispensing, clear labeling, and easy-to-use packaging formats reinforce trust and satisfaction. Monitoring refill data, such as batch tracking, refill frequency, and shelf life, helps identify potential issues early and allows for quick corrective action.

The goal is to make the refill experience **seamless, safe, and consistent**, so that customers have no reason to doubt the quality of the product they are buying. Without this assurance, even the most sustainable refill system will struggle to gain traction.

For guidance on industry standards related to washing and sanitizing reusable packaging, we recommend reviewing the PR3 Washing Standard developed by the PR3 Standards organization. This resource provides detailed, consensus-based best practices to ensure packaging is cleaned to the highest safety and quality benchmarks.

Replenishment

Replenishment in refill systems involves managing the timely restocking of bulk products, refill containers (when relevant), and associated supplies to ensure uninterrupted service. A shortage or lack of stock will bring a negative experience for customers - it is already hard enough to instill a mindset shift, don't let a lack of stock come in the way of building your momentum! Time is especially of the essence in B2C models where customers are waiting to buy a product in that exact moment.

Replenishment includes monitoring inventory levels at refill stations or stores, forecasting demand, and coordinating with suppliers or centralized hubs. Effective replenishment requires **just-in-time logistics**, **data tracking**, and sometimes **reverse logistics** for collecting and cleaning. For example, a refill station in a supermarket may rely on IoT sensors to alert staff when a bulk bin is low, triggering an automated restock order.

Know who is responsible for the replenishment and train them to ensure you won't run out of stock.

Spotlight: Refillables Đong Đầy

Founded in 2018 in Central Vietnam, Refillables Đong Đầy started as a bold zero-waste retail experiment. From the beginning, it focused on delivering eco-friendly daily products like cleaning agents and food items without single-use packaging. Refillables Đong Đầy has completed over 65,775 refills for both individual customers and businesses - demonstrating its tangible impact on waste reduction.

In 2025 Refillables Đong Đầy introduced new 2-liter and 5-liter standardized refill containers based off customer feedback and operational needs. The new reusable bottles now include basic product information—such as product name and ingredients—applied by stamp, along with a return message to encourage reuse. Previously, reliance on second-hand containers led to issues like lost or dirty bottles, inconsistent sizes, and logistical inefficiencies. By developing their own line of standardized containers, the team tackled these challenges head-on and laid the groundwork for a scalable reuse system. Read more about Refillables Đong Đầy journey in this blog.

Image credit: Yunus Environment Hub Vietnam & Refillables Đong Đầy

Inventory management

Managing inventory in a dispenser involves regularly monitoring product levels, ensuring proper rotation, and maintaining accurate records to trigger timely refills. This can be done **manually through routine checks** or automatically using **sensors or smart dispensers** that track usage in real time.

Each refill should be logged with **batch numbers and dates** to ensure traceability and compliance with safety standards. Additionally, dispensers should be cleaned and sanitized between refills, and FIFO (first-in, first-out) practices should be used to prevent product degradation or expiration.

Logistics

Logistics are crucial for refill systems because they ensure the **efficient, safe, and consistent flow of products and containers** throughout the reuse cycle. Without reliable logistics, issues like delayed restocking, unsanitary container handling, or bottlenecks in returns and cleaning can disrupt the system, reduce customer trust, and increase operational costs. Efficient logistics are essential to scale refill systems sustainably while keeping costs manageable and customer experience smooth.

Key components include:

1. **Forward logistics** – Transporting bulk products to refill stations or stores, often in large dispensers or refillable packaging. It can also include transportation of your product directly to end users for at home refill models.

2. **Reverse logistics** – Reverse logistics moves goods from customers back to the sellers or manufacturers. This includes collecting used containers for cleaning, refilling, and redistribution.

Logistics will vary depending on whether you are a B2B or B2C company.

B2B models: As these deal with high volume refills, you will want to work with less frequent, scheduled return cycles (e.g., containers collected during the next delivery).

B2C models: Refill at home solutions may use last-mile delivery for transportation such as vans, bikes or couriers. For last mile transportation, incorporating a low-emissions service (ie: e-bikes) could help strengthen your value proposition to customers to bring more environmentally friendly solutions across the whole process.

It is essential to know who is responsible for your logistics. You may outsource this to a third party, or have someone manage internally depending on size and scope of your operations. You can look outside traditional logistics companies for opportunities to collaborate with an existing system or partner for more efficient logistics.

When defining roles and responsibilities, make sure to clarify:

- Who does the delivery?
- Who collects the used container?
- How this reverse logistic affects the units economics of the business?
- Who washes and under which standard?

Best Practices to Increase Efficiency and Reduce Environmental Footprint

- Source Locally: Whenever possible, source products close to your sales locations to reduce transportation emissions and support local economies. For instance, EcoTrace (Kenya) sources detergents locally, promoting local manufacturing and employment.
- Optimize Packaging: Use standardized refillable containers to increase return rates and minimize excess packaging like plastic wraps, aligning with sustainable packaging guidelines. Check out this *Guide to Setting and Implementing a Sustainable Packaging Strategy* from Anthesis Group.

- Optimize Transportation: Employ efficient logistics such as electric vehicles and shared transport to lower costs and environmental impact, a practice seen in several circular economy initiatives globally.
- Automate Processes: Implement automation for tracking and managing returns to boost operational efficiency and accuracy, as demonstrated by leaders in reuse logistics.
- Partner with Third-Party Logistics (3PL): Collaborate with expert logistics providers to handle reverse supply chains, improving scale and service quality.

Just transition perspectives

Just Reuse: Waste Picker perspective on Reuse (India)
This recent report from Switch Asia examines reuse models through a just transition lens by drawing on the perspective of waste pickers in Pune, India. Waste pickers are the most vulnerable and stakeholders the plastics-waste-environment discourse, whom are very often not considered in circular models being developed and implemented locally.

Read the full report to see what refill and return models were identified as the most likely to include waste pickers in the value chain, and reflect on how you can design a reuse model that embraces a just transition approach.

Warehousing

In a refill business, your warehouse is the central hub where you store bulk quantities of products before they are dispensed. For brands, you may have this on site in your location, but for reuse companies and retailers, you may rely on warehousing to source products to then refill on site or deliver to homes. Warehousing must be aligned closely with your logistics process and replenishment timing to ensure you don't have excess stock on site but also are never lacking products for customers to purchase. Warehousing is essential both for B2B as well as B2C models.

Smaller B2C models might be able to store smaller amounts of products directly on site, for example in a local grocery or shop. Depending on the scale of your operations, warehousing can be managed either onsite (at the point of sale) or offsite (in a central facility), with trade-offs between space efficiency, replenishment frequency, and control over stock.

Depending on the origin of your products, you may want to buy in larger or smaller amounts. For example, local products could be purchased more frequently, but products sourced from farther away may be more advantageous to buy in bulk and keep at a local warehouse location.

Washing

Washing in refill systems is a critical process that ensures **hygiene, safety, and product integrity**, especially when containers are reused for food, personal care, or cleaning products. The process typically involves **cleaning, rinsing, and sanitizing** containers and dispensing equipment either on-site or at centralized washing facilities. Washing protocols must follow industry-specific standards to remove residues, prevent cross-contamination, and maintain regulatory compliance.

Depending on the system and costs, washing options could include **manual washing**, **automated dishwashers**, or **industrial cleaning lines** using high-temperature water, food-safe detergents, or sanitizing agents. Effective washing is essential to maintain customer trust and protect public health.

There is a lot to consider in your washing process to ensure an efficient and effective process (except for the case of BYOC, where customers are responsible for proper washing at home, and this should be clearly communicated to ensure they bring clean containers for refill). From water and energy used in the process, to the drying and stacking of packaging for reuse. You consider using a 3rd party provider to take care of your washing as part of your value chain mapping.

Recommended resources related to washing:

- PR3 washing standards
- Wash location mapping (USA and Canada)

Hardware maintenance

Hardware maintenance for refill systems is essential to ensure safety, hygiene, and consistent performance. It includes **regular cleaning and sanitization** of dispensers, valves, and nozzles to prevent contamination, especially important for food, personal care, and cleaning products. Routine **inspections and servicing** are needed to check for leaks, wear and tear, or blockages, and to calibrate dispensing mechanisms for accurate measurement. In smart systems, **electronic components** like sensors, touchscreens, or QR code scanners must also be maintained and updated to avoid malfunctions. A well-documented maintenance schedule helps extend equipment lifespan and maintain user trust.

What happens if your dispensing machine has a faulty part or needs repair? You will need to ensure access to spare parts, which you can do as part of your Service Level Agreement (SLA). A SLA is a formal document that defines the expected level of service between a service provider and a customer. It outlines the specific services to be delivered, the standards or performance metrics that must be met, and what happens if those standards are not achieved. This is especially important in refill models that source their hardware externally, as it will outline how long you would have to wait to repair something, if the cost is included as part of the hardware guarantee, etc. Having a clear SLA will provide clarity and avoid confusion if and when changes are needed.

Founder Advice: Rajneesh Patel, iRefill
"Start small by testing your solution in a pilot. This will allow you to learn and adapt based on user experience and other key factors before you invest in scaling. Learn from the pilot—location, customers, and end users—what worked and what didn't. Then adapt, iterate, make changes, and plan accordingly."

Insights to Algramo Operations – Case: Unilever at Walmart Chile

One of the most significant refill projects Algramo implemented was with Unilever in Walmart Chile. In this B2B refill model, Unilever supplied Walmart with bulk product, typically in 200-litre or 60-litre containers, which Walmart staff would then use to replenish in-store refill dispensers for end consumers. This approach reduced single-use packaging, maintained product quality, and allowed consumers to purchase well-known Unilever brands in a more sustainable way.

A key operational success factor was the **real-time refill alerts** built into the dispensers. These alerts informed store staff when the product level was running low, helping to avoid stock-outs and maintain a seamless consumer experience. However, one of the biggest challenges was not the replenishment itself, but the **purchase reorder signal within Walmart's system**. For the refill station to work sustainably, Walmart needed to trigger purchase orders to Unilever at the right time, aligned with the dispenser's usage patterns and lead times for delivery.

This "reorder signal" gap became one of the most critical operational bottlenecks. When replenishment alerts from the dispenser were not fully integrated into Walmart's purchasing workflow, delays in ordering meant dispensers could run empty, undermining customer trust and sales. The lesson: **in refill systems, technical alerts must be matched with efficient supply chain and procurement processes**. Without alignment between inventory data, store operations, and supplier deliveries, even well-designed refill infrastructure can fail to deliver consistent service.