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Reverse Logistics Strategies for the Post-pandemic Supply Chain: Spaces and Places to Recapture Value

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Executive Summary

Effective supply chain management is crucial for any organization operating in today's complex business environment, and logistics is a key part of the supply chain equation. Given heightened competition, tightening margins and an increased focus on environmental sustainability, some consumer and industrial product companies are turning to reverse logistics (RL) as a "final frontier" where logistical competencies can generate financial success. RL involves the management of products and materials flowing backward in the supply chain from customers toward sources, after they have been returned or become obsolete. The aims of RL are to maximize the remaining value of returned items and minimize related costs.

Effective implementation of RL requires a carefully designed supply chain. Collaboration between commercial real estate practitioners and supply chain experts is essential to identify suitable locations for RL activities, negotiate favorable lease agreements and implement best-in-class facility designs. The NAIOP Research Foundation commissioned this report to provide insight into best practices in RL supply chain design and the implications for facility location and design. The study is of use to organizations seeking to improve their RL capabilities and to supply chain executives and developers interested in calibrating building design and location to maximize operational revenue and reduce costs. It specifies the types, characteristics and locations of facilities that businesses should incorporate into their RL networks. Appendix A at the end of this report provides a detailed description of the locational and design needs of RL facilities for specific industries. Key findings from the report include:

- Third parties that provide outsourced RL services generally need to be centrally located relative to the industry they serve, close to industry-preferred modes of transportation, close to the source of product returns, near a sufficiently large labor market, and have access to waste management infrastructure. They should seek to balance these locational priorities against real estate costs.
- For firms that insource RL, multiple smaller, regional facilities may in many cases be better than a single, centralized facility. Locational priorities (proximity to transportation, waste management infrastructure, labor and customers) are otherwise similar to those for third-party RL facilities, though their relative importance varies by industry.
- Real estate professionals can play a pivotal role in identifying suitable RL facility locations that meet supply chain managers' strategic criteria.
- The decision to locate insourced RL processes in a dedicated facility or within a facility that also handles forward logistics depends on the firm's industry and the scale of RL the facility must manage.
- A firm's industry will also shape whether an RL facility should be built-to-suit or if a speculative project or existing facility can meet its needs. Either way, RL facilities require dedicated spaces for specialized tasks such as returns management, refurbishing, recycling, and waste management, and benefit from flexible interior design.
- Converting an existing warehouse or distribution center for RL usually does not require major changes to the building's structure. However, RL facilities often require more power than traditional warehouses, and some need specialized docks, ramps and secure loading areas.

Introduction

In the years just before and after the global pandemic, American businesses sold more than $6 trillion worth of products annually. During this time frame, the number of items being returned to stores or manufacturers increased substantially, and by the end of 2023, about 10% of items bought in physical stores and nearly 18% of items bought online were being sent back upstream.[1] This record level of returns is attributed to various factors, with billions of individual items of all types being sent back each year. The number of returns has continued to increase by about 5% annually since 2021.[2] This trend is occurring, to a significant degree, because stores, manufacturers and even shippers are making it easier to return unwanted products. Product returns reflect the timeless American business mantra that “the customer is always right,” such that over the past 50 years, the ability to return products has gradually become a basic expectation for U.S. customers. Consequently, American business leaders in product and material industries have embraced a new saying: “not everything that is sold, stays sold.”

In the modern business landscape, delivering products precisely when and where customers demand them at reasonable prices is a fundamental requirement for competitiveness. Business leaders give themselves a chance to succeed when they can meticulously construct networks of facilities and infrastructures—taking the form of integrated supply chains—that efficiently and effectively connect raw material sources, production facilities, distribution centers, warehouses and wholesale/retail outlets. On a good day, a company’s supply chain optimizes the efficient flow of products in the downstream direction, from supply sources toward consumer destinations and through all points in between. However, companies and their managers face a far more complex puzzle when it comes to designing, laying out and operating physical networks of facilities that can strategically handle returned products flowing in the opposite direction, from customers to sources.

Though returns are increasingly prevalent, their handling remains a tricky problem for many retailers, distributors and manufacturers. Supply chains are often poorly engineered to handle products that are pushed back upstream; they have traditionally been set up to move things toward rather than away from points of consumption. Creating physical, relational and technological networks that can allow products to flow in any direction efficiently and with precision is a key new business competency. Those companies that can take back products and quickly figure out what they are worth and what to do with them have a marketplace advantage. Unfortunately, many companies continue to struggle to handle returns. Even those with well-developed logistical capabilities often regard returns management as wasted effort, a distraction or a burden rather than as an opportunity to capitalize on a recaptured asset. One key impediment is that the facilities in use today are engineered to push products toward the end user with great precision but are often inadequate to deal with large-scale flows moving in both directions simultaneously.

Enter reverse logistics (RL), which is the art of planning, implementing and managing the flow of goods in the opposite direction of traditional supply chains. RL involves the handling of returned, unsold or obsolete items from consumer to producer, including activities such as recycling, refurbishing, repairing or disposing once a final disposition decision has been made. RL seeks to maximize the value recovered from returned goods while minimizing waste and environmental impact. However, effectively managing RL requires a supply chain that looks quite different from what is needed for traditional “forward” logistics, including a network of facilities specifically engineered for tasks that unique to RL. This study specifies the types, characteristics and locations of facilities that businesses should incorporate into their RL networks. It examines supply chain design to improve RL outcomes, physical location and building design that support RL, and related considerations for real estate development professionals.

The report begins by exploring the current state of RL and directly contrasting RL and traditional or "forward" logistics principles. These comparisons reveal major differences in how the systems are managed, what methods are used, and what assumptions about forward and reverse logistics serve as operating foundations. Next, the report investigates how modern business and societal trends affect the design of supply chains, both forward and reverse. It is important to understand how prevailing factors in the business landscape affect decision-making processes regarding RL. The analysis allows for a comprehensive overview of the current state of RL network design.

The report then presents current RL best practices identified by study participants. Finally, it summarizes a set of guidelines that can help supply chain and real estate professionals anticipate the preferred attributes of RL facilities for a range of clients with different needs.

Methodology

To gain deeper insights and potentially enhance current practices, this research combines established knowledge with primary data collection and analysis. By soliciting input from a diverse array of thought leaders and decision makers regarding their organizations' strategies for RL-based network design, the study investigates this evolving field and provides more detailed insights to complement existing ones.

Due to the open-ended nature of the research questions, qualitative research techniques were used to delve into the complexities of reverse supply chain design, particularly regarding the location and design of facilities supporting RL activities. Eleven experts hailing from diverse industry backgrounds and possessing substantial experience with RL topics were interviewed in late 2023 and early 2024. Questions focused on current business practices related to RL and what RL systems will need to look like in the future. The experts were specifically asked how the companies they are familiar with are setting themselves up to handle product returns now and in the future and what strategies they currently (or expect to) employ. This approach allowed for an empirical exploration of the topic while ensuring that the findings were both robust and applicable to real-world scenarios. Respondents included supply chain managers, RL specialists, supply chain planners and a consultant. Collectively, respondents represented or provided services to firms in the electronics, retail, clothing and third-party logistics (3PL) industries.

Data was gathered using a "grounded theory building" technique, which is detailed in Appendix B. Via this method, the interviews served as the primary source of data collection, providing rich insights into the intricacies of RL network and facility design.

The State of Modern Logistics and RL Practice

Modern supply chains are not merely conveyors moving goods, subassemblies or materials from point A to point B; they are intricate networks meticulously engineered to link raw material sources with production facilities, distribution centers, warehouses and, ultimately, the hands of consumers, at the lowest possible total cost and with minimized waste in the forms of motion, material, time or treasure. Picture a finely tuned orchestra, with each component playing its part in perfect harmony with the others, but with the goal being to deliver physical products instead of music. In the final stanza of this performance, products arrive precisely when and where they are needed, and always at competitive prices. Best-in-class supply chains represented by this sort of symphony become the backbone of a successful products or services enterprise when managed effectively. They drive cost-effectiveness, customer satisfaction, market agility, and environmental and social sustainability efforts, among many other desirable goals for makers and sellers. A high-level view of a typical supply chain moving products, related materials or information toward the customer—i.e., using forward logistics—is illustrated in Figure 1. Moving forward, the report refers to forward logistics simply as “logistics,” both to keep things simple and to stay in sync with common industry terminology.

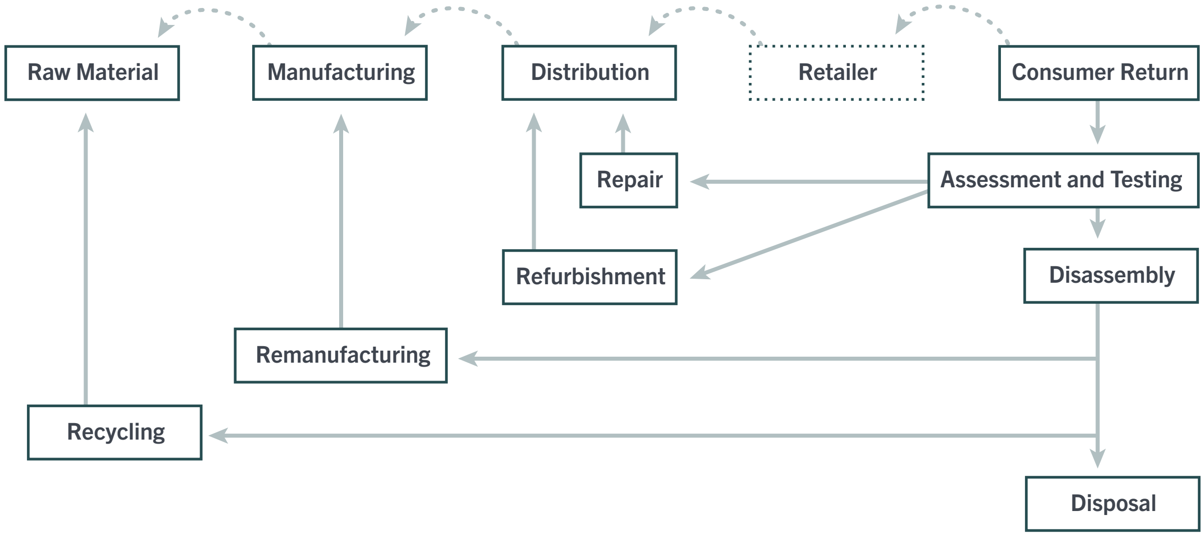
FIGURE 1 : Forward Logistics – Product, Material, and Information Flows

Logistics represents the “engine” of the supply chain for most companies because it is the business function that ensures that products reach customers efficiently while meeting their demands with precision. In contrast, RL deals with issues related to the flow of goods in the opposite direction, resulting from product returns. RL often involves handling returned, unsold or obsolete items and determining the most appropriate disposition method to create maximum value for the company and its partners.

Though some companies have struggled to incorporate RL activities into their strategic activities, others have begun to create and use systematic RL decision frameworks. The decision process depicted in Figure 2 is a structured framework that helps companies that are more advanced in terms of RL to manage returns efficiently, maximizing value recovery and minimizing costs while supporting customer satisfaction. This process begins with the return authorization, when consumers request a return and companies validate the request based on policies such as customer return windows, warranty terms and product condition. Once authorized, the returned product is received and verified against the authorization details.[3]

Upon receipt, returned products may undergo inspection, testing and sorting to determine their condition and the actions necessary to capture value. Products are then categorized into restockable, repairable, refurbishable, recyclable/remanufacturable or disposable items. Restockable items can be immediately returned to inventory, while refurbishable and repairable items are restored to a sellable condition and placed back into regular distribution channels. Remanufacturable items are placed back into the manufacturing process and then redistributed for sale. Recyclable items are sent to facilities where they are decomposed, valuable materials are recovered for use in future manufacturing, and disposable elements are responsibly disposed of following environmental regulations. Sometimes items are recalled by manufacturers or retailers to avoid customer service or safety issues; such items are disposed of or repaired depending on the economic trade-offs posed by the situation.

FIGURE 2: The Reverse Logistics Process



Note: Dashed arrows indicate one or more steps may occur between nodes.

By understanding and effectively managing the RL decision process, companies can recover value from returned products, reduce costs and enhance customer satisfaction. Real estate and supply chain professionals jointly contribute to this process by providing strategic solutions and optimizing facility operations.

Strategic and Tactical Approaches to Logistics and RL

Supply chain managers navigate logistics and RL differently based on strategies tailored to their distinct challenges. Generally, logistics involves the development and execution of large-scale, repetitive processes, i.e., managing large volumes of products destined for a relatively constrained set of known locations according to long-term plans. For example, a global electronics manufacturer may leverage logistics to ensure that thousands of smartphones are available in retail stores across the country or world on a regular basis, following established distribution routes, production batch sizes, shipment quantities and delivery schedules. These logistics operations are planned well in advance and provide visibility to manufacturing and transportation progress with anticipated delivery dates.

In contrast, RL managers grapple mostly with exceptions. Companies are forced to handle smaller batches of products of unpredictable composition that are heading to diverse (and often, temporarily unknown) upstream destinations, due primarily to unpredictable customer return behaviors. Consider an online clothing retailer processing returns from customers across the country, with little visibility on inbound return volumes, and with a wide variety of returned garments, each of which requires individual assessment, potentially unique processing, quality inspection or testing, and final disposition based on item-specific factors such as product condition, freshness of style, and existing inventory levels by location.

Accordingly, the tactical objectives driving logistics also differ markedly from those guiding RL. With traditional, forward logistics, the primary focus is on achieving cost efficiency, minimizing lead times and meeting customer expectations. For instance, a food delivery service prioritizes timely and cost-effective transportation of perishable goods to ensure freshness upon arrival at customers' docks or doorsteps. Conversely, RL aims to extract maximum value from specific returned items while minimizing waste and addressing sustainability concerns. Consider for example a technology company refurbishing returned smartphones with the intention of reselling them at a reduced price, thereby reducing environmental impact and maximizing recovery value. In RL, accurate product evaluation and disposition take precedence over customer time requirements, in contrast to the emphasis on product velocity in logistics.

Successful RL necessitates distinct tasks, strategies and network setups due to its differing objectives compared with traditional logistics processes. RL requires specialized spaces within buildings to handle quasi-routine tasks such as returns management, refurbishment, recycling and waste management. These tasks focus on optimizing value recovery and minimizing environmental impact, in contrast to the customer-centric focus of traditional logistics systems. While forward logistics streamlines repetitive product flows to customers, RL must treat each product return as a unique event, making efficiencies challenging to achieve. Therefore, a critical decision for managers is whether to integrate logistics and RL within a single facility or to allocate dedicated spaces for RL within the company's facility network. Table 1 summarizes the key strategic, objective and task differences to aid decision-makers in analyzing this issue.

TABLE 1: "Forward" vs. Reverse Logistics

	Traditional or "Forward" Logistics	Reverse Logistics
Strategies	• Gain efficiencies through repetitive processes and movements • Focus on scale/managing large product volumes • Use a long-term planning horizon	• Seek high effectiveness by focusing on exception-based processes that are custom to each situation • Focus on handling smaller batches of products while minimizing total cost and maximizing value recaptured • Use a very short-term planning horizon unless returns are highly predictable
Objectives	• Achieving cost efficiency • Minimizing lead times • Meeting customer expectations	• Maximizing value captured • Reducing waste • Addressing sustainability concerns
Tasks	• Moving and storing large product/material volumes • Optimizing and managing inventory • Meeting schedules (production, delivery, etc.)	• Managing returns • Making disposition decisions • Refurbishing and recycling when restocking is inadvisable • Managing waste

Societal Trends Impacting RL Practice

In the current highly dynamic marketplace, consumers wield unprecedented power, and technological advancements continually reshape the industry landscape. Companies are increasingly recognizing supply chain management as a critical battleground for gaining competitive advantage. However, the complexities presented by globalization, ever-changing consumer expectations and other societal forces are challenging companies' ability to do any supply chain management task well—and RL is no exception, as seen in Table 2.

TABLE 2: Trends Affecting Consumer Returns

Societal Trend	Phenomenon Explained
E-commerce Growth	With the rise of online shopping, consumers return items more frequently due to factors like sizing issues, "purposeful returns" from overordering, inaccurate product descriptions or dissatisfaction upon receipt.
Flexible Return Policies	Many businesses offer lenient return policies to remain competitive, which can encourage more returns as consumers feel more comfortable making purchases knowing they can easily return items.
Subscription Services	The popularity of subscription-based models can lead to increased returns as consumers can return items they no longer want or need without the hassle of cancellation fees.
Fast Fashion	The fast-paced fashion industry, with its constant turnover of new styles and trends, can lead to impulse purchases that are later returned once their novelty wears off.
Product Quality and Reliability	If product quality or reliability decreases due to cost-cutting measures or supply chain disruptions, consumers may return items more frequently because of defects or malfunctions.
Increasing Customer Expectations	As consumers become more accustomed to personalized experiences and instant gratification, they may demand to return products more frequently or quickly if their expectations are not met or a better deal is available elsewhere.
Environmental Concerns	Increasing awareness of environmental issues may lead some consumers to return products that are not environmentally friendly or sustainable, contributing to the unpredictability of returns.
Supply Chain Disruptions	Disruptions in the supply chain, such as those caused by natural disasters, trade disputes or pandemics, can lead to delays or shortages, prompting consumers to return products they no longer need or want after they are finally delivered.
Rapid Technological Advancements	Advances in technology can result in products becoming obsolete or outdated faster, leading to more frequent returns as consumers seek newer, more advanced alternatives.
Changing Demographics	Shifts in demographics, such as an aging population or changes in consumer preferences among younger generations, can influence purchasing decisions and contribute to fluctuations in product returns.

These trends, and perhaps others, challenge modern organizations seeking to optimize their reverse supply chains and execute RL programs. However, a few guiding principles have been developed and discussed in recent years and are beginning to take hold. These ideas are helping savvy managers in their quest to create a more modernized approach to RL-based network design, including the location and configuration of facilities that handle RL.

General Principles in RL Network Design

Contemporary reverse supply chains, including overall networks and their constituent facilities, are being designed to reflect growing emphases on efficiency, sustainability and customer satisfaction. Businesses are responding to heightened consumer expectations for seamless returns processes and eco-friendly practices by developing sets of "best practices," but doing so has led to a pivotal choice for many companies: whether to invest in new facilities capable of handling returns processing and refurbishment or to outsource these functions. The decision involves strategic considerations, with complex trade-offs between competencies, costs and return volumes.

Several factors drive the RL insourcing versus outsourcing decision process. First, business leaders assess whether RL aligns with their core competencies and strategic objectives. If it is integral to their value proposition or they possess specialized expertise, insourcing may be preferred to maintain quality control and customer experience. Second, cost analysis is crucial. Companies are constantly weighing labor, facility costs, transportation and potential economies of scale. Outsourcing may or may not offer cost savings through access to specialized expertise and shared resources.

Additionally, companies must honestly evaluate their internal capabilities and capacity to handle RL activities. Outsourcing becomes attractive if they lack necessary resources or appropriately knowledgeable personnel, while insourcing may be more feasible if they have underutilized capacity and existing talent. Moreover, any possible impacts on customer satisfaction and loyalty must be considered. Insourcing is preferred if maintaining control over the returns process seems highly desirable for reasons related to customer expectations, while outsourcing to 3PL providers can enhance service levels if leadership is willing to relinquish some control. Ultimately, the insource/outsource decision requires a comprehensive assessment of strategic objectives, operational capabilities, financial considerations and market dynamics.

In concert with modern supply chain management thinking, three best practices regarding RL design, whether insourced or outsourced, seem to be commonly held:

- Proximity to transportation hubs and major distribution lanes should typically be prioritized to minimize transit times and reduce transportation costs associated with returned goods.
- Flexible facility layouts and modular designs, with no or little fixed infrastructure are favored to accommodate fluctuating and difficult-to-predict volumes of returned items and to support agile operational adjustments in bulk stacking or pallet racking.
- Integration of sustainable practices such as recycling and waste reduction is becoming increasingly important, with businesses seeking locations that support eco-friendly initiatives and offer access to recycling facilities or renewable energy sources.

Despite being well-intentioned, these general principles are somewhat fundamental, and much remains unknown about how to optimize reverse supply chain networks and facility designs in support of RL processes. Companies must continue to invest in innovation, as well as collaborative and sustainable practices, but how can they also enhance their competitiveness, reduce costs and deliver superior customer experiences via mastery of RL and returns management? Interviews with professionals with substantial RL experience revealed a range of practices and facilities requirements that vary depending on a firm's industry and its returns volume.

Revealed Themes in RL Facility Location and Design

Respondents indicated that collaboration between industrial real estate professionals and supply chain experts is essential to identify suitable locations for RL activities, negotiate favorable lease agreements, and implement best-in-class facility designs that align with business objectives and customer expectations in support of these arrangements. Respondents suggested that by fostering open communication and sharing expertise, both parties can jointly evaluate potential properties and creatively problem-solve to optimize facility layouts and mitigate cost implications. The interviews also revealed additional key themes that should be of use to the managers and executives designing reverse supply chains and the real estate professionals supporting them. All the themes identified in this section were mentioned by multiple participants and are important to consider when developing a supply chain design that can support more widespread and technically precise RL activity.

Locational Considerations

Study participants considered facility locations for RL operations crucially dependent on proximity to industry-preferred, supply chain-optimal transportation modes. RL facilities require efficient access to appropriate transportation networks to facilitate the return and redistribution of products. Unlike logistics, which focuses on outbound deliveries on known schedules and at economically advantageous scales, RL needs to manage an unpredictable influx of returned items. For example, an RL facility for cellphones should be strategically located near major highways and local roads to ensure efficient pickup and delivery of returned devices. Partnerships with local courier services are essential to manage the influx of returns and redistributions effectively. This enhanced connectivity ensures that returned products can be moved quickly and efficiently, minimizing delays in processing returned items, which is less of a concern in logistics, where road proximity is less important than economies of scale.

Supply chain managers typically use quantitative formulas or algorithms to identify sets of suitable facility locations... Real estate professionals should help them with the strategic choice between several equally viable options.

Modern locational algorithms also guide supply chain managers to locate RL facilities in areas with greater customer density, because more returns originate in urban centers and residential suburbs. Having proximity to the source of returns can reduce net transportation costs and improve returns processing speed, lessening the amount of time a returned product remains out of circulation. Proximity to urban and dense suburban areas may also help an occupier access the skilled labor required for inspection, product testing, repair and refurbishment.

A key recommendations theme was that supply chain managers should work with real estate developers to identify and prioritize areas with easy access to transportation infrastructure—such as highways, ports or rail hubs—to facilitate the efficient movement of returned goods. In fact, it was suggested that real estate professionals can play a pivotal role in actualizing supply chain managers' location recommendations. Supply chain managers typically use quantitative formulas or algorithms to identify sets of suitable facility locations to choose from based on strategic criteria. Real estate professionals should help them with the strategic choice between several equally viable options. To this end, real estate professionals should scout locations that contain sites meeting the specified RL criteria. Brokers can also assist supply chain managers by helping to negotiate lease or purchase terms for facilities located in strategically advantageous areas, ensuring that reverse logistics operations are seamlessly integrated into the broader supply chain network.

Without insight into the decisions that guide facility location, real estate professionals and civic planners face challenges in developing properties to meet the specific needs of RL operations. Often, otherwise suitable properties may lack proximity to necessary logistical infrastructure. Alternatively, the development community can offer insights into factors that RL managers tend to hold constant or take for granted because these are also factors that render locations highly suitable for regular logistics. For instance, competition for prime locations near transportation hubs can drive up real estate prices, rendering seemingly desirable locations untenable. Respondents see deep collaboration between RL and real estate professionals as essential to overcoming these challenges.

Additionally, despite the collaborative efforts between supply chain and real estate professionals, issues such as regulatory hurdles, zoning restrictions and environmental concerns can delay or impede the development of new facilities or modifications to existing ones. However, proactive, collaborative engagement between supply chain and real estate professionals and local authorities, community stakeholders, and environmental agencies can help preempt potential roadblocks. By navigating these challenges collectively and adopting a holistic approach, supply chain and real estate professionals can successfully establish robust RL operations that drive value for businesses and meet evolving consumer demands.

Design Considerations

Space utilization can differ significantly between RL and logistics. RL facilities often need specific areas for tasks that require specialized equipment and dedicated spaces to be performed effectively. For example, in an RL facility handling vehicles being taken out of service, areas may be designated for the removal of hazardous materials like fuel, oil or batteries, which require specialized tools and safety protocols. Additionally, during the disaggregation processes for some products, it is important to keep removed components physically separated from others with a partition or interior wall. For instance, as vehicles are disassembled, batteries must be kept separate from fuel tanks. If not properly segregated, a stray spark from a battery could ignite residual fuel, posing a significant safety risk. This type of separation also prevents cross-contamination, ensuring that each component can be processed or recycled effectively.
By comparison, logistics facilities focus on maximizing storage capacity and efficient product movement, generally with less need for specialized areas.

Key Design Recommendations

- Design interiors so that layouts can be easily adapted over time.
- Provide adequate power.
- Collaborate with RL experts to ensure buildings can support advanced technologies when needed.
- Provide specialized docks, ramps and secure loading areas as needed for fragile and high-value items.

Relatedly, space flexibility can be a key concern for RL facilities. RL generally involves handling smaller batches of products with varying size, material, durability, perishability and security profiles/characteristics, all of which may be unknown to logistics planners until just before volumes actualize. Some respondents suggested that decision-makers should ensure the facilities in the selection set for RL operations are flexible and adaptable to accommodate fluctuating volumes and diverse types of returned items.

Real estate professionals, facility design consultants, integrators, and supply chain professionals could potentially assist in meeting these requirements by designing facilities with modular spaces that can be easily reconfigured for different RL tasks such as returns processing, refurbishment and recycling. Such facilities should incorporate scalable building infrastructures that allow for expansion or contraction based on demand fluctuations. Any finished facilities should include dedicated areas for inspection, testing, repair, data wiping, and secure storage of high-value items, and these spaces should be designed to meet specific technical needs. Brokers can assist in other ways, such as scouting for warehouse spaces pre-equipped with modular shelving systems, temperature-controlled zones and secure storage areas. One respondent suggested that real estate professionals could negotiate lease agreements that offer flexibility in terms of expansion or contraction of space, allowing businesses to scale their RL operations according to changing demands.

Real estate professionals could negotiate lease agreements that offer flexibility in terms of expansion or contraction of space, allowing businesses to scale their RL operations according to changing demands.

Respondents indicated that challenges persist related to handling diverse product types within a single facility. In contexts where the returns process yields collections of subcomponents made from different materials as products are disaggregated (e.g., consumer electronics, durable goods), sorting, processing and storing harvested materials may require specialized equipment and efficient workflows. The size and configuration of spaces required for these functions may escape developers and supply chain managers, at least at first. Real estate professionals must collaborate closely with RL experts, and potentially manufacturing experts or consultants, to ensure facilities can accommodate advanced technologies that preserve material integrity. However, highly specialized interior layouts may be less necessary in other settings where an RL facility will primarily process homogenous or bulk materials that can safely interact with one another (e.g., clothing/textiles).

Respondents also noted that RL facilities often need more power than those used for traditional logistics. RL facilities usually need to support diagnostic, repair and refurbishment operations, all of which typically require high-capacity electrical supplies and reliable backup power systems. In contrast, logistics facilities normally need less power since their primary activities involve case-splitting, (de)packaging, storage and shipping, which are often more manual and less energy-intensive and do not necessitate the same level of technical infrastructure. However, logistics facilities designed to incorporate automated pick or put-away systems may already have sufficient power capabilities for RL uses.

Additionally, the transportation services supporting RL facilities must often handle easily damaged products carefully. This includes the use of vehicles supporting both vibration- and climate-control features to prevent damage to electronic components. These features are less commonly required in standard logistics, where new-product packaging better protects items from environmental conditions. For efficient on- and off-loading, these trucks may require nonstandard docks or ramps to be in place at the facilities they serve. Similarly, secure transport services to prevent theft or loss are needed if an RL facility processes high-value items, especially for returned electronic goods that may still contain customer data. These specialized transportation services maintain the integrity and value of returned products as they move through the RL network (unlike logistics, which focuses on cartons of eaches, pallets and bulk shipments). This may necessitate loading and unloading areas designed for greater security and cargo protection.

Facility Conversion and Adaptation

In some cases, RL facilities will need to be developed on a build-to-suit basis, but speculative projects and existing warehouses may also be adapted to accommodate RL for certain occupiers, depending on their operational needs and the building's location and configuration. Introducing specialized spaces to an existing building may require costly modifications such as reconfiguring storage or adding temperature controls, sanitary rooms or other features not commonly found in typical warehouse and distribution buildings.

Properties with existing infrastructure or amenities that could potentially streamline RL operations are particularly attractive targets for adaptation to RL.

Converting an existing warehouse or distribution center to an RL facility generally does not require significant modifications to the building's shell and superstructure (walls, floors, columns, roof, etc.). Clear heights that are suitable for logistics will generally meet or exceed requirements for an RL facility, whose functions do not typically require as much vertical space within a building. RL facilities can typically be accommodated in a building with a 30-foot clear height, and buildings with clear heights exceeding 36 feet are not cost-effective for most RL occupiers. Most of the required changes that respondents identified are to a building's interior configuration, which needs to be adapted to an occupier's specific RL needs. Properties with existing infrastructure or amenities that could potentially streamline RL operations are particularly attractive targets for adaptation to RL. For example, properties with pre-existing product sorting or processing facilities or easy access to specialized waste management services may offer significant advantages in terms of operational efficiency and cost-effectiveness. New speculative projects that are primarily designed for logistics can generally be adapted to RL so long as they have flexible interior layouts to facilitate additional tasks, such as returns processing, refurbishing and recycling. RL occupiers generally prefer to forgo racking and automated systems that are bolted to the floor.

Using Technology to Create Flexibility

When businesses conduct world-class logistics, physical technology and hardware are tailored to handle a bevy of unique challenges, and the same holds true for the processing of returned products. Flexible robotics and automated storage and retrieval systems (ASRS) are crucial for efficiently managing traditional logistics flows and are increasingly being applied to the more dynamic RL context. For instance, robots equipped with advanced sensors and AI can quickly sort and categorize returned items based on condition and required processing steps, such as refurbishment or recycling. However, unlike logistics, where products typically move through a streamlined and predictable path, RL requires flexible and adaptable systems to mitigate returns-related variability. ASRS systems for RL are being designed to store and retrieve items with varying degrees of (re)usability, ensuring that "borderline cases" are easily accessible for inspection, repair or disposal. These systems can significantly enhance efficiency by automating the storage and retrieval processes, reducing manual handling and minimizing the risk of damage to returned items once received at the RL site.

On the software side, a few respondents noted that RL relies on specialized solutions to manage the complex processes associated with returns handling. Warehouse management systems (WMS) with RL features "bolted on" are useful for tracking returned items through each stage of the reverse supply chain. These systems integrate with returns management software (RMS) to provide a comprehensive view of returns processes, from initial receipt to final disposition. RMS solutions also enable companies to process returns more efficiently by automating key tasks such as issuing return authorizations, tracking the status of returns transactions and managing customer notifications. Advanced analytics and machine learning algorithms embedded in the systems can predict return volumes, identify patterns in return reasons and suggest demand-side improvements to reduce return rates. Unlike traditional logistics applications, where the software primarily focuses on optimizing outbound shipments and inventory management, RL software must handle the added complexity of processing and tracking a wide variety of returned items, each potentially requiring different handling and disposition actions.

While technological advancements can address some of the operational challenges associated with handling diverse product types, they also introduce new complexities in terms of integration and maintenance. Real estate professionals should consult often with supply chain experts to stay abreast of emerging technologies and industry best practices to effectively advise clients on implementing appropriate solutions. For example, by regularly engaging with experts on the latest advancements in automation, real estate professionals can guide clients in selecting facilities that are not only optimized for current needs but also flexible enough to accommodate future improvements. Ongoing training and upskilling programs can also empower RL-focused employees to leverage technology effectively and foster a culture of continuous improvement. For instance, a facility that regularly updates its recycling processes based on the latest environmental standards and technological advancements can more effectively manage diverse product types while reducing waste and improving efficiency. By fully embracing the supply chain management principle of continuous improvement, real estate professionals can help their clients implement iterative enhancements that address operational challenges in RL and drive long-term, sustainable growth.

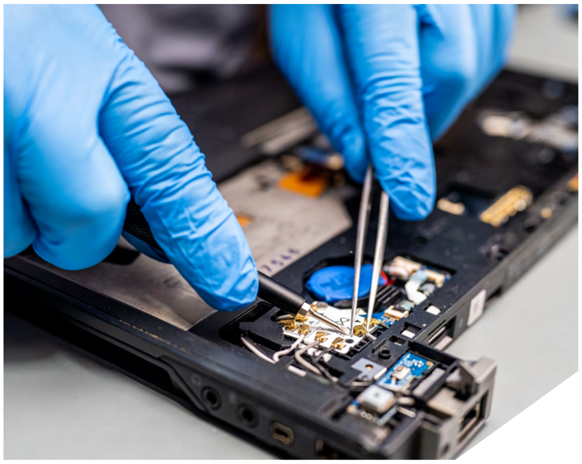
Waste Management and Environmental Considerations

Facilities handling RL tasks like refurbishing, recycling and waste management require commensurate infrastructure and environmental considerations. Real estate professionals can assist supply chain managers by identifying locations with appropriate zoning regulations and infrastructure support for waste management activities. A respondent suggested developers can play a crucial role in addressing these requirements by conducting thorough assessments of potential sites prior to selection to ensure compliance with environmental regulations and suitability for the intended activities. Developers can also specifically collaborate with environmental consultants to evaluate the ecological impact of RL operations and jointly recommend sustainable practices to mitigate adverse effects.

Best Practices for Environmental Sustainability

- Ensure that a site’s zoning allows for key RL processes.
- Locate near waste management facilities and recycling centers.
- Evaluate and recommend ways to mitigate the ecological impact of a facility’s operations.
- Consider green design elements and certifications for build-to-suit properties.
- Collaborate with occupiers to obtain incentives for sustainable design and operations.

Respondents indicated that RL facilities frequently require access to eco-friendly infrastructure, such as recycling centers or wastewater treatment facilities. Those that process electronics should also have access to e-waste disposal facilities to ensure the safe and environmentally compliant disposal of electronic waste. Establishing direct routes and agreements with certified e-waste recyclers is crucial for environmental regulatory compliance and for reducing the ecological impact of electronic waste—tasks not often encountered in logistics operations. Respondents also expressed a preference for properties with environmental certifications or the potential for renewable energy integration, and a couple expressed interest in green building standards and energy-efficient design principles to minimize the carbon footprint of RL facilities.



However, implementing sustainable infrastructure and practices may require substantial up-front investments, potentially impacting the overall cost-effectiveness of operations. For this reason, developers may wish to limit the financial risk of more expensive sustainable design elements by saving these for build-to-suit projects and should be prepared to model how specific sustainability features might affect an occupier's operating costs. Developers can also collaborate with occupiers to identify and pursue incentives for sustainable design and building operations, such as those offered by federal, state or local governments, utilities and nonprofit organizations.

Adaptability to Shifting Needs

Despite recent efforts by real estate professionals to provide suitable facilities for RL operations, one interviewee noted challenges related to aligning facility capabilities with business objectives in perpetuity. Variability in RL service demand combined with evolving customer preferences introduces uncertainties that impact ongoing facility utilization and resource allocation. Simply put, as RL "demand" is increasing, it is also doing so at an increasing rate. To address these challenges, developers and building owners should adopt flexible approaches to facility management, incorporating scalability and adaptability where possible. Fostering open communication and collaboration with distributors and manufacturers can facilitate feedback loops and related adjustments to facility designs and operations to align them with evolving needs. In cases where an individual company does not (yet) need the use of an entire RL facility, some occupiers participate in collaboratives that pool the RL operations of multiple firms into a single building. However, this tends to work well only in some industries, and some tenants may not align well with others from operational and safety perspectives. It is important to consider tenants' specific sector and unique requirements to implement strategies that can accommodate flexibility and growth.

RL Design and Location Priorities by Occupier Type

A closer examination of RL nuances for different types of end users can provide real estate professionals with a better understanding of how to locate and design facilities that will meet their needs. This section considers the distinct design and location needs that influence the selection of facilities for manufacturers, retailers and 3PL companies. Additional suggestions are also provided to assist supply chain managers in designing effective RL supply chains for each sector. Detailed descriptions of RL needs and priorities for specific industries are outlined in Appendix A.

Manufacturers

Design and Location Needs

Manufacturers, distributors and retailers typically all benefit from dedicated RL facilities that focus on product returns, repairs, refurbishments and recycling. These facilities need to be near manufacturing plants to streamline the flow of returned goods back into the production cycle. Proximity to skilled labor pools and recycling centers is also advantageous for efficient operations. For instance, establishing centralized return centers near local labor sources ensures the availability of specialized expertise in product diagnostics and refurbishment.

- **Most Likely Building Type:** Dedicated facility for reverse logistics.
- **Recommendation:** Build-to-suit facilities are preferable to ensure specific requirements are met, such as specialized equipment for diagnostics and repairs, and spaces for sorting and refurbishing.

Supply Chain Management Themes

Manufacturers must focus on product quality and reliability, as efficient RL processes can significantly reduce costs associated with returns and repairs. Building robust RL networks helps mitigate the impact of supply chain disruptions by allowing quicker turnaround times for returned products, ensuring minimal downtime in production cycles. Addressing product quality issues proficiently requires facilities equipped to inspect, repair or dispose of defective items with high efficiency.

Retailers

Design and Location Needs

Retailers often integrate RL into existing logistics operations, using space within their distribution centers for processing returns. This approach can lead to congestion and inefficiencies, particularly during holiday or peak seasons. Flexibility in facility design and a location near major consumer hubs are critical for managing high return volumes efficiently and limiting impacts on logistics operations.

- **Most Likely Building Type:** Facility where RL is embedded into regular logistics operations.
- **Recommendation:** Retrofitting existing buildings can be cost-effective and practical, provided the design allows for adaptable layouts to manage fluctuating return volumes.

Supply Chain Management Themes

It is paramount for retailers to manage consumer expectations and address supply chain disruptions. Flexible return policies necessitate agile RL processes. Being located near transportation hubs and urban centers helps to reduce transit times and improve customer satisfaction. Facility designs that feature high-speed and automated sorting systems and flexible layouts can better handle rapid fluctuations in return volumes.

3PL Companies

Design and Location Needs

3PL companies often require strategically positioned facilities within regional industry clusters to serve multiple clients efficiently. The selection of facility locations for these providers hinges on real estate availability, labor market proximity, transportation infrastructure and tax incentives. For instance, a 3PL provider may establish a facility in a state with favorable tax policies and a skilled and affordable labor pool, allowing the company to offer competitive pricing and efficient service to its clients.

- **Most Likely Building Type:** Dedicated facility for RL.
- **Recommendation:** Build-to-suit facilities ensure that 3PL providers can offer tailored services to their clients, incorporating scalability and advanced automation technologies to handle varying return volumes.

Supply Chain Management Themes

3PL companies must prioritize flexibility and resilience in their RL networks. Efficiently managing supply chain disruptions involves having multiple facility locations and diverse transportation routes. Additionally, partnerships with manufacturers and retailers to offer integrated RL solutions can enhance service quality and reliability.

Conclusion

Retail experts predict that customer return volumes will continue to grow for the foreseeable future, increasing the fiscal and environmental costs and lost opportunities for retailers and manufacturers that do not have an effective RL system in place. Although supply chain managers are keenly aware of these hazards and many have begun to implement some RL processes, this study confirms that uniform approaches to RL have yet to emerge. The perception of RL as either a cost or a value driver significantly influences how and to what extent companies proactively manage returned goods and materials. Whether insourced or outsourced, effective RL strategies require standardized processes, efficient facility locations and alignment with broader business objectives to maximize value creation and minimize costs.

Real estate developers and brokers play a pivotal role in the implementation of RL by identifying and developing facilities that will meet an occupier's specific RL-related needs. Leveraging local and regional geographic advantages is paramount in this endeavor. For companies that insource their RL functions, properties located near transportation infrastructure, such as highways, railways or ports, offer logistical efficiencies by reducing transportation costs and transit times for returned products. Since few retailers and manufacturers have deployed a comprehensive RL strategy, supply chain executives will find "plug and play" real estate solutions to be particularly valuable. Firms that handle outsourced RL functions for other companies may prioritize locations with lower overhead costs or proximity to third-party transportation providers to achieve better coordination.

In addition to delivering solutions for individual occupiers, developers can advocate for eco-industrial parks or green zones that prioritize environmental stewardship and offer incentives for businesses committed to sustainable practices. Leveraging local market knowledge, real estate professionals can pinpoint areas with robust recycling infrastructures and renewable energy initiatives. Additionally, areas with robust technological and innovation ecosystems provide access to advanced automation technologies and expertise in supply chain optimization, benefiting both insourced and outsourced operations.

When evaluating properties for distribution facilities that can handle RL efficiently and effectively, real estate professionals should prioritize enhancing operational efficiency and cost-effectiveness. Properties located in regions with access to diverse labor pools, including skilled workers, are essential for effectively managing RL operations. Furthermore, areas with favorable tax rates and incentives for sustainable practices enable firms to reduce operational costs and enhance environmental stewardship. Properties near major transportation hubs or intermodal facilities offer logistical advantages, facilitating the efficient movement of returned products. Leveraging these local and regional geographic advantages allows real estate professionals to identify properties that meet the unique needs of RL supply chains, driving outcomes such as reduced lead times and improved sustainability.

This study highlights the complex dynamics of RL practices in the manufacturing and retail sectors and the challenges that firms face in adopting effective strategies. By collaborating with the real estate development community, supply chain managers can better navigate these challenges, enhancing the efficiency of their operations.

Appendix A-1: Reverse Logistics Priorities by Occupier Business Type

Business Type	Outsource Partner/3PL	Heavy Industry MFG	Apparel/Textile MFG	Electronics & Auto Parts MFG	Apparel E-tailers and Online Markets	High-volume/ High-complexity Retailers	Low-volume/ Low-complexity & Specialty Retailers
Examples	XPO, C.H. Robinson, UPS, FedEx Solutions	Ford, GM, Komatsu, Boeing, GE, Siemens	Zara, Under Armour, H&M, Adidas, Levi's	Samsung, LG, Bosch, Honeywell, Continental Tire	Zappos, Warby Parker, Etsy, Blue Nile, Wayfair	Amazon, Walmart, Best Buy, Home Depot	Local boutiques, seasonal pop-ups, convenience
Unique Sector Goals	Efficiently manage returns and reverse flows on behalf of clients; maximize value recovery from returned goods; minimize costs associated with handling and disposal of nonresalable returned items.	Effectively manage end-of-life products, equipment and components; minimize environmental impact through responsible disposal/ recycling; maximize value recovery from recyclables.	Efficient gatekeeping process to quickly decide on recycle vs. restock or refurbish; minimize waste and environmental impact through recycling and upcycling; maintain product quality and integrity throughout the RL process; allay risks of counterfeiting.	Recover valued materials/ parts/ components from end-of-life products; ensure compliance with regulations governing e-waste and hazmat; minimize landfill waste and pollution through responsible recycling.	Streamline returns processing to meet customer satisfaction goals; minimize costs due to high volumes; gatekeep quickly to move to resale/recycle decision faster.	Efficiently handle high return volumes; accurate returns forecasting/ batching; use demand management to avoid returns.	Attentive customer service; personalized returns experiences; minimal processing times.
Unique RL Activities	Receiving and inspecting returned merchandise; sorting and categorizing returned items based on condition and disposition; refurbishing, repairing or repackaging returned products for resale or reuse; recycling or disposing of unsalvageable items in an environmentally responsible manner; providing good reporting and analytics on RL for clients.	Decommissioning and disaggregating old/ retired equipment and machinery; salvaging reusable components and materials for refurbishment or resale; recycling scrap metal, plastics and other materials recovered; ensuring compliance with regulatory requirements and environmental standards for waste management and disposal.	Sorting returned garments by brand, size and condition; laundering/cleaning returned apparel items as needed; repairing, recoloring or retagging damaged garments to restore them to saleable condition; donating unsold or excess inventory to charity or recycling same; using sustainable manufacturing practices to reduce textile waste and promote circular economy.	Disassembling and harvesting components from returned devices/ parts; testing and refurbishing any reusable components for resale or reuse; properly handling and disposing of hazardous materials; recycling precious metals and other priority recoverable materials.	Providing prepaid return labels and return shipping options for customer convenience; automating returns authorization and processing through AI, online portals and self-service tools; inspecting, restocking and replenishing returned inventory for resale or clearance; leveraging predictive analytics to identify trends and patterns in returns behavior and optimize inventory management strategies.	Establishing dedicated/owned returns processing centers/RL facilities to handle high volumes; investing in advanced automation and sorting technologies to expedite returns processing and restocking; offering incentives for customers to return items in-store or at designated collection points near facilities.	Supporting (customizing) very flexible returns policies; streamlining exchanges back to sales floor; converting returns to exchanges; minimizing shipping.

Appendix A-2: Locational Requirements for Reverse Logistics by Occupier Business Type

Business Type	Outsource Partner/3PL	Heavy Industry MFG	Apparel/Textile MFG	Electronics & Auto Parts MFG	Apparel E-tailers and Online Markets	High-volume/ High-complexity Retailers	Low-volume/ Low-complexity & Specialty Retailers
Unique Facility Location Requirements	Ideally central within major transportation hubs/industrial zones to facilitate efficient inbound and outbound logistics; access to highways, railways and airports is key; proximity to clients' distribution centers or MFG sites also could be important if clients are local.	Locate near major manufacturing centers or industrial parks to minimize transportation costs for inbound raw materials and outbound finished goods; access to transportation infrastructure suitable to convey heavy machinery and equipment is critical.	Proximity to fashion districts or textile MFG hubs (and easy access to raw materials and skilled labor); locating near well-established supply chain networks and transportation infrastructure preferred but may not be mandatory.	Proximity to technology and automotive clusters gives access to specialized suppliers and skilled labor; need transportation infrastructure nearby capable of handling delicate components/ parts.	Central locations with easy access to major carriers and distribution networks to streamline returns processing and minimize transit times; proximity to urban areas with high population density and online shopping penetration may also be advantageous.	Strategic locations near major population centers or transportation hubs to facilitate efficient distribution and returns processing; access to advanced automation and sorting technologies needed to handle high volumes effectively, but these may not be location specific.	Proximity to target customers based on demographics, and to niche markets in order to enhance customer service and minimize shipping costs; flexible facility layouts to accommodate fluctuating inventory levels and seasonal demand.
Embedded or Stand-alone?	Stand-alone facility is needed to maintain confidentiality and security for multiple clients' returns. However, embedding could be feasible for smaller-scale operations or if RL can be sufficiently segregated from forward logistics and product/material security measures are in place.	Stand-alone facility is recommended due to the specialized nature of operations and potential environmental concerns. Embedding within a current manufacturing facility could be considered if space and regulatory requirements permit.	Stand-alone facility probably preferred to maintain cleanliness and separation from manufacturing. Embedding within a current manufacturing facility may be feasible for small-scale RL.	Stand-alone facility is needed due to the specialized nature of operations and potential safety hazards. This is not always happening though.	Embedding probably feasible for smaller-scale online retailers.	Embedding within a current forward logistics facility is likely feasible for retailers with integrated forward and reverse logistics operations. However, these are rare.	Embedding within a current forward logistics facility should be feasible for retailers with minimal RL operations.

Appendix A-3: Design and Technological Requirements for Reverse Logistics by Occupier Business Type

Business Type	Outsource Partner/3PL	Heavy Industry MFG	Apparel/Textile MFG	Electronics & Auto Parts MFG	Apparel E-tailers and Online Markets	High-volume/ High-complexity Retailers	Low-volume/ Low-complexity & Specialty Retailers
Unique Facility Internal Design Requirements	Flexible layout to accommodate diverse clients' needs and varying volumes of returns; advanced sorting and categorization systems needed to efficiently process a variety of returned merchandise; several secure storage areas needed for both resalable and nonresalable items.	Large, open floor plans to accommodate heavy machinery and equipment; specialized areas for deconstructing, salvaging and recycling operations; facility must comply with environmental regulations and safety standards (local/state/ federal).	Dedicated spaces needed for garment sorting, laundering, repairing and refurbishing; efficient workflow design to minimize handling and processing times—requires space.	"Cleanroom" facilities needed for sensitive electronic components or hazardous materials handling; testing and refurbishment areas equipped with advanced diagnostic tools and equipment; proper waste disposal and recycling facilities to comply with environmental regulations.	Technological solutions/systems integrated with online platforms for seamless customer experience are a must-have; flexible storage solutions to accommodate varying inventory levels and seasonal fluctuations also desirable (on- or off-site is a good question here); real-time inventory tracking and reporting capabilities.	High-capacity storage and sorting facilities to handle large volumes of returns efficiently; advanced automation and robotics for sorting, restocking and replenishing operations.	Streamlined layout to minimize handling and processing times for small batches of returns; personalized customer service areas for handling unique requests or special inquiries; might want modular design to accommodate future expansion or changes in business needs.
Space Requirements	Due to handling returns for multiple clients, estimate approximately 100,000 to 500,000 square feet based on scale for RL.	They will be dismantling, salvaging and recycling heavy equipment and machinery. Estimate approximately 50,000 to 200,000 square feet for RL.	Due to sorting, laundering, repairing and refurbishing requirements for garments, estimate 30,000 to 100,000 square feet.	Moderate square footage needed for testing, refurbishment and recycling of electronic components or auto parts. Estimate approximately 40,000 to 150,000 square feet.	Estimate approximately 20,000 to 80,000 square feet.	Large space needed for processing high volumes of returns efficiently. Estimate approximately 50,000 to 300,000 square feet but could be more, or more than one facility with splits by product type.	Estimate approximately 10,000 to 50,000 square feet.
Technological Needs/ Advantages for RL in This Sector	Advanced sorting systems; predictive analytics platforms.	Asset tracking systems; environmental monitoring technologies.	Automated inspection devices; RFID.	Testing and diagnostic sensors.	Returns management software to do quick authorizations and refund processing.	WMS bolt-ons for returns; robotic picking and packing.	None are necessary.

Appendix B: Grounded Theory Methodology

To achieve a balance of rigor and relevance in this study, a grounded theory approach was employed, combining qualitative and quantitative techniques. This approach allowed for a comprehensive exploration of the topic while ensuring that the findings were both robust and applicable to real-world scenarios.

1. **Literature Review:** The research began with an extensive review of existing literature on reverse logistics and supply chain management. This step aimed to establish a solid theoretical framework and identify gaps in current knowledge. By synthesizing insights from previous studies, the research design was refined to address these gaps effectively.
2. **Qualitative Data Collection:** Semi-structured interviews were conducted with supply chain managers, real estate professionals and industry experts. These interviews provided rich qualitative data, allowing for an in-depth understanding of participants' perspectives, experiences and challenges related to reverse logistics supply chain network design. Careful attention was paid to sampling to ensure diversity in perspectives and experiences, enhancing the validity and reliability of the findings.
3. **Data Coding and Analysis:** Qualitative data from interviews were transcribed and coded using thematic analysis. Themes and patterns were identified within the data, allowing for the extraction of key insights and findings. This approach to data analysis ensured a comprehensive understanding of the research topic from multiple perspectives.
4. **Integration of Findings:** Qualitative findings were integrated through a triangulation approach, where data from different sources were compared, contrasted and synthesized to develop a holistic understanding of reverse logistics supply chain network design. This integration helped validate findings across methods and provided a more nuanced interpretation of the results.
5. **Validation and Peer Review:** The research findings were validated through peer review and feedback from three experts in the field. This step helped ensure the accuracy and credibility of the findings and provided additional insights for interpretation.

Overall, this qualitative methodological approach, combining multiple highly respected techniques with rigorous data collection, coding, analysis and integration, facilitated the development of rich insights into reverse logistics supply chain network design while maintaining both rigor and relevance.

Endnotes

Additional Sources: Kiplinger, The Economist, Wells Fargo Research, PGIM, Green Street, various company filings and investor presentations.

1 National Retail Federation and Apriss Retail, "2023 Consumer Returns in the Retail Industry," December 22, 2023, https://nrf.com/research/2023-consumer-returns-retail-industry; Elise Dopson, "Ecommerce Returns: Expert Guide to Best Practices (2024)," Commerce at Scale (blog), Shopify, September 6, 2023, https://www.shopify.com/enterprise/blog/ecommerce-returns.

2 Mordor Intelligence, "US Reverse Logistics Market Size & Share Analysis: Growth Trends & Forecasts (2024-2029)," https://www.mordorintelligence.com/industry-reports/united-states-reverse-logistics-market.

3 In practice, a return can happen anywhere there is a finished good inventory, including retail stores. Companies may also choose to avoid the returns process entirely by deciding to write off the item and allowing the customer to keep, donate or dispose of it.

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