EXECUTIVE INSIGHTS

Packing a Punch: Ecommerce Packaging Optimization Strategies

The ongoing transition from brick-and-mortar to online purchasing has increased the importance of packaging and distribution operations for companies operating in the ecommerce space. According to eMarketer, U.S. ecommerce penetration is expected to increase to 21% in 2026 from 8% in 2016. The rise of ecommerce has introduced substantial complexity for fulfillment providers and brand owners that are trying to meet three important objectives: managing costs, improving their sustainability footprint and elevating the customer experience.

The price of inefficiency

As ecommerce fulfillment operations expand to keep up with increasing order volume, the impact of inefficiencies has become significant. Historically, the cost of inefficiency was relatively minor; but as shipping volumes have accelerated, those inefficiencies can now mean millions of dollars in unrealized cost-saving opportunities. When coupled with the current labor shortages and inflation, failure to address inefficiencies can have serious financial ramifications. Specifically, packaging providers can improve operational inefficiencies in three main areas:

1. Process inefficiencies, such as using a large box to ship a small item
2. Poor sustainability driven by inefficient packaging choices such as overconsumption of single-use packaging materials (e.g., void fill, protective materials)
3. Deteriorating customer satisfaction (e.g., increasing likelihood of product damage, which creates a negative customer experience)

Improving the picture

In our experience, there are a few ways to improve packaging operations that will address these key issues and deliver cost savings, improved sustainability metrics and a better customer experience. Among the most effective are consolidating shipments, expanding the use of padded mailers, shipping directly in vendor packaging and revisiting algorithms to better match box size to purchase order.

To improve process inefficiencies, optimizing packaging decisions can enable companies to capture direct savings on their packaging material spend and benefit from lower freight fees. Right-sized packaging also allows vendors to maximize their fixed allotment from carriers. For example, fully utilizing fixed allotments during periods of high demand means companies can avoid paying higher market rates elsewhere.

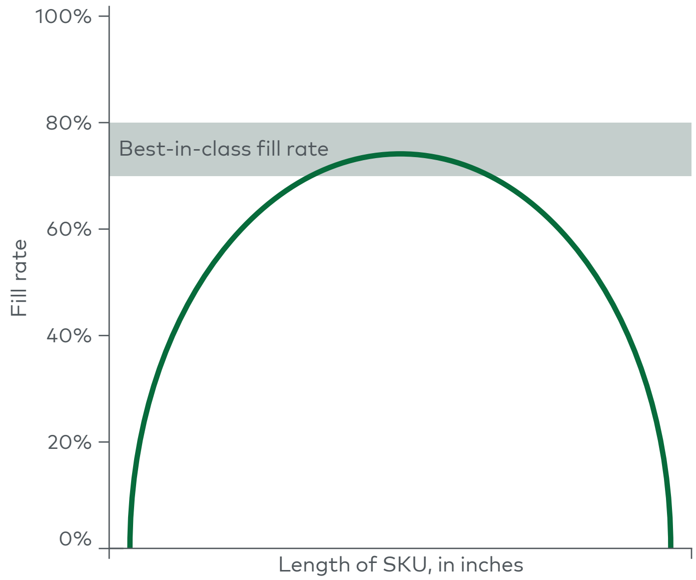
Further, improvement in packaging operations also helps bolster a company's environmental, social and governance (ESG) profile. For instance, reducing volumes and eliminating void fill help to both reduce material usage and improve the carbon footprint of downstream distribution. These improved packaging practices are now moving from "nice to do" to "must do," as brand owners and fulfillment providers look to differentiate themselves through ESG initiatives. With many major brands already announcing environmental commitments, not having an integrated cost and ESG strategy can limit the growth potential of a business.

Finally, brand owners and fulfillment providers must continuously elevate the customer experience. In the packaging arena, improving the customer experience generally focuses on two main objectives: delighting the customer through the unboxing experience and minimizing the potential for product damage. Fortunately, providing added value for customers does not need to be at the expense of cost savings or ESG improvement. In fact, the most effective ecommerce fulfillment providers and brand owners are able to deliver to meet all three objectives.

Cost improvement within packaging operations

Leading ecommerce companies are consistently reviewing operations to look for cost savings opportunities in the areas of material usage, transport (typically measured as the parcel's dimensional weight, or dim weight) and labor. The root of most packaging inefficiency is high void rates (i.e., the amount of empty space between the product(s) shipped and the shipping container). Void rates tend to follow a U-curve structure, with the fill rate greatest for the smallest- and largest-sized stock keeping units (SKUs) versus SKUs that are in the middle (see Figure 1).

Figure 1
Representative fill rate curve



- Lower fill rates for SKUs 15+ inches may be due to mismatches between SKU height and height of longer corrugated boxes:
  - Longer SKUs do not typically have a large height dimension (e.g., skateboards)
  - Typically, longer corrugated boxes also have a larger height
  - A mismatch between the above two factors potentially creates the extra void in those items
- Market participants suggest that 75%-85% is the best-in-class fill rate, as higher levels create challenges in the picking and customer unboxing processes

Note: SKU=stock-keeping unit
Source: L.E.K. research and analysis

Higher void rates are generally the result of a SKU-packaging mismatch. Corrugated boxes are usually not a good fit for smaller SKUs (for example, a box of pens or a pair of socks), and companies would be better off considering alternative packaging formats, such as padded mailers. For larger items (for example, poster frames or duffle bags), void usually occurs because a company's corrugated box inventory is not sufficiently customized to the size of SKUs being shipped.

We use a three-step approach to address this issue, which we recommend implementing before considering potential technology investments (see Figure 2). This approach relies on building out a hierarchy to determine which packaging fits best — shipping directly in the vendor's packaging (if applicable) or transitioning to mailers or smaller corrugated boxes — and defining which SKUs would fit under each of those packaging solutions (see Figure 3). Each transition results in a lower cubic volume per package (leading to a lower dim weight and reduced transportation cost), savings in packaging material used, and superior sustainability outcomes for the fulfillment provider and brand owner.

Figure 2
Prioritization criteria for shipping

Packaging optimization model

1 Vendor packaging → **2 Mailers** → **3 Smaller boxes**

1. **Vendor packaging**: Identify which products don't need additional packaging and ship these in vendor packaging
2. **Mailers**: For smaller packages not suitable for vendor packaging, consider flexible packaging
3. **Smaller boxes**: For remaining packages, look for ways to downsize shipping boxes

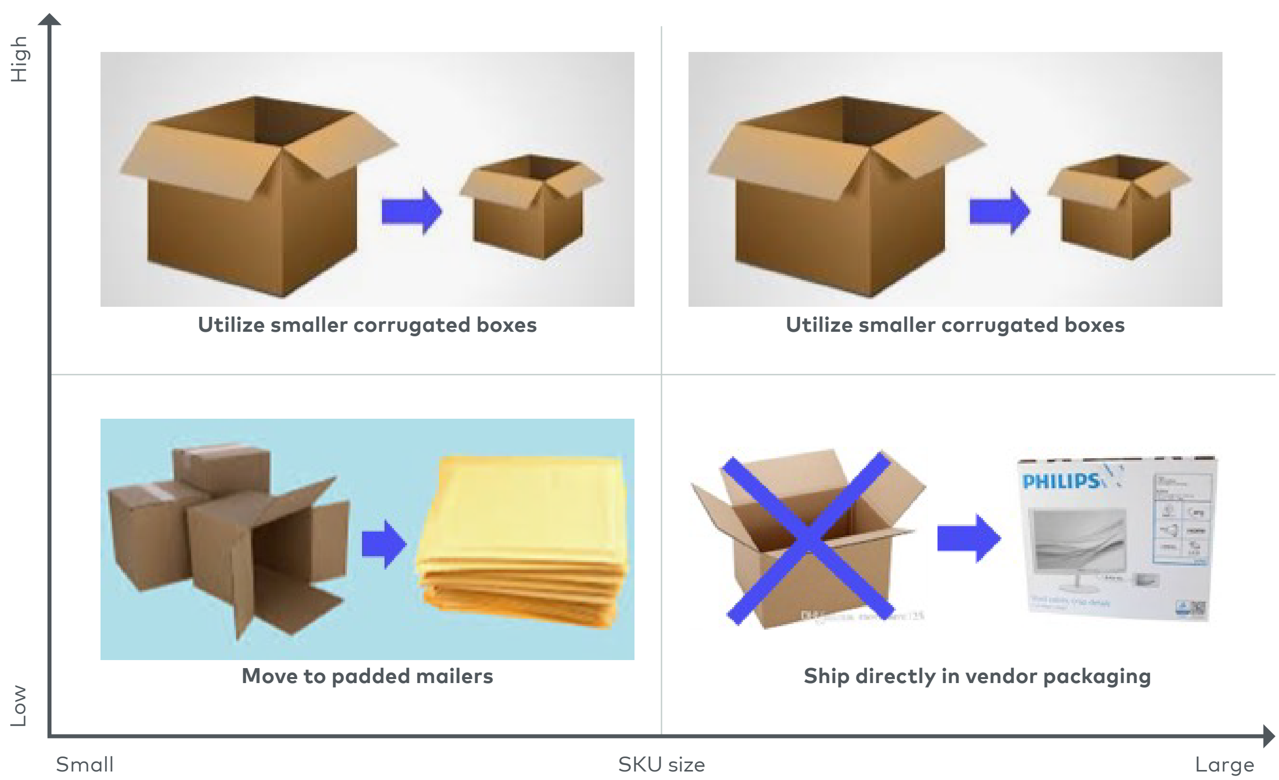
Fulfillment providers can leverage financial incentives to drive vendors toward more optimized packaging models

The weight and importance of each prioritization step will depend on the types of SKUs shipped

Note: SKU=stock-keeping unit
Source: L.E.K. research and analysis

Figure 3
A multi-tiered shipping strategy

Use SKU size and value to determine appropriate shipping method



Note: SKU=stock-keeping unit
Source: L.E.K. research and analysis

Vendor packaging: The most efficient shipping method is to simply use the original vendor packaging with no reboxing. Although there are some exceptions (e.g., expensive or easily damaged SKUs), shipping in vendor packaging decreases the void rate, reduces incremental packaging material and saves labor by eliminating repacking.

Padded mailers: Padded mailers are an optimal solution for shipping flexible products (e.g., clothing, backpacks) or smaller items. They offer an opportunity to maximize carrier shipment allocations, lower dim weight and capture cost savings. Not only do mailers cost less than corrugated boxes, but they also do not require void fill material, which reduces shipping costs. In fact, transitioning to mailers can result in a 3% reduction in freight costs and a 20%-50% reduction in packaging material spend. Further, mailers offer protection comparable to that of corrugated boxes, as the item is less likely to move around and be damaged, thus maintaining a good consumer experience. As environmentally friendly mailers continue to be rolled out, we expect they will comprise an increasing share of parcel shipments.

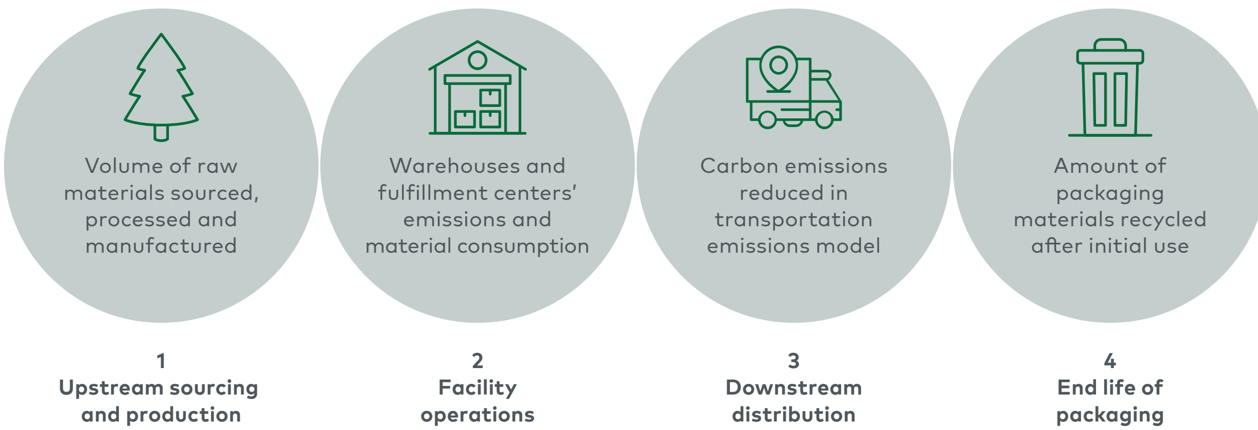
Smaller corrugated boxes: Packaging outcomes for items not suitable for shipping in a padded mailer or vendor packaging can still be improved by transitioning those items to right-sized corrugated boxes. Shipping appropriate items in smaller corrugated boxes can reduce freight costs by 7% and material spending by around 20%. One common mistake that ecommerce fulfillment companies often make is selecting corrugated box sizes once, without ever reviewing their decisions. As the number of SKUs shipped grows, the result is a mismatch between available boxes and SKU sizes. This situation can be further exacerbated when fulfillment providers continue to add box SKUs rather than trying to optimize operations for a select number of boxes (often fewer than 20 corrugated box SKUs are needed). Better product-to-box matching will help companies capture incremental dim weight savings, and more prudent and scaled corrugated box sourcing will lead to savings on materials.

ESG capability expansion

Ecommerce fulfillment providers are increasingly tasked with not only delivering operating efficiency and lower costs, but also supporting brand owner ESG objectives. While many cost-saving initiatives deliver concurrent ESG benefits (e.g., reducing material usage), compared with consumer-facing companies, fulfillment providers tend to be further behind in terms of articulating and measuring an approach to ESG. This means there is an opportunity for forward-thinking providers to develop a basis for differentiation. Companies might also consider investing savings realized from efficiency activities into ESG initiatives. This might include expanded use of sustainable packaging or augmenting sustainability credentials to appeal to brand owners and supply chain partners.

We recommend partnering with fulfillment providers and brand owners to establish a set of metrics that enable performance tracking over time (see Figure 4). A good way to start is by establishing a metric that assesses both carbon footprint and material usage across company operations from packaging sourcing to end of life. A carbon footprint metric should capture the impact of individual packaging decisions as well as companywide controlled emissions (i.e., Scope 1 and 2 emissions). Material usage metrics detail absolute material usage as well as the degree of recyclability.

Figure 4
Measuring ESG impact across the packaging life cycle



Note: ESG=environmental, social and governance
Source: L.E.K. research and analysis

As ESG capabilities expand, it will be important for providers to develop a holistic ESG profile and a broad set of performance criteria that supports it.

Customer experience delivery

When providers make adjustments to their fulfillment operations, one potential concern is the prospect of negatively impacting the end-customer experience. If the changes spark an increase in customer returns, this can lead to higher direct costs. If customers are dissatisfied with the manner in which goods are received (for instance, if a high-value or delicate item is shipped in a padded mailer), there may be an uptick in customer churn. All of this will negatively impact both the brand owner and the fulfillment provider.

This is why it is important to consider customer experience impacts of both cost-saving and ESG initiatives, and this is central to our own strategic approach. For instance, transitioning products to padded mailers, utilizing smaller boxes and consolidating shipments all serve to augment the customer unboxing experience. Customers typically prefer packaging that is right-sized to the product shipped. Not only does this make the disposal process more efficient, but products are less likely to arrive damaged due to tighter packing. Packaging (e.g., printing on the box) can also be used to communicate a company's ESG commitments. This can increase customer loyalty, particularly for those customers inclined to purchase brands with superior ESG outcomes relative to their peers.

Changes that pack a punch

As more retail shifts online, there is a greater need for companies across the value chain to optimize their processes for greater efficiency and cost savings. The current labor shortage and the growing impact of inflation make process efficiency more important than ever. Furthermore, as packaging volumes increase, the cost of inefficiency compounds. If you've found yourself in a situation where your fulfillment center activities have expanded rapidly and so have inefficiencies, there are some steps to consider.

First, identify opportunities to improve outcomes. A detailed assessment of system void rates and boxing decisions can highlight a range of cost-saving measures for both materials and transportation. Next, develop a technology roadmap that can complement existing activities. Baseline cost savings can be augmented through incremental investment in packaging technology. Finally, track performance against meaningful indicators. A customized set of evaluation criteria can help brand owners and fulfillment providers unlock cost savings while delivering superior customer experiences and ESG outcomes for their stakeholders.

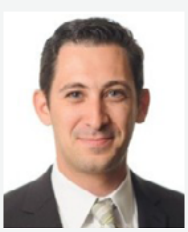
For more information, please contact industrials@lek.com.

About the Authors

Thilo Henkes
Thilo Henkes is a Managing Director in L.E.K. Consulting's Boston office and leads the firm's global Paper & Packaging practice. Thilo is also active in the firm's Building & Construction, Industrial Equipment and Private Equity practices. He joined L.E.K. in 2000 and has more than 20 years of consulting experience specializing in transaction support and developing post-acquisition value-enhancing strategies for portfolio companies. Consulting magazine named Thilo a 2021 Global Leader in Consulting.

Jeff Cloetingh
Jeff Cloetingh is a Managing Director and Partner in L.E.K. Consulting's Boston office. As a leader in the firm's Paper & Packaging practice and broader Industrials team, Jeff has worked with corporate and financial sponsor clients globally on the development of growth strategy, go-to-market commercial strategy, investment thesis development, value creation plans and M&A transaction support. He has worked in consulting since 2006 and with L.E.K. for the past decade.

Simon Horan
Simon Horan is a Managing Director in L.E.K.'s Chicago office and a part of the leadership team for L.E.K.'s Organization & Performance practice. Simon has worked across a variety of strategy, organization and performance improvement engagements throughout Asia-Pacific and America. His passion is assisting clients in driving major change, from defining the change to delivering the results.



Jordan Cohen
Jordan Cohen is an Engagement Manager in L.E.K. Consulting's New York office. Jordan advises clients in the industrials and technology sectors on a range of topics, including growth strategy development, digital transformation and M&A assessment.

About L.E.K. Consulting
We're L.E.K. Consulting, a global strategy consultancy working with business leaders to seize competitive advantage and amplify growth. Our insights are catalysts that reshape the trajectory of our clients' businesses, uncovering opportunities and empowering them to master their moments of truth. Since 1983, our worldwide practice — spanning the Americas, Asia-Pacific and Europe — has guided leaders across all industries, from global corporations to emerging entrepreneurial businesses and private equity investors. Looking for more? Visit **www.lek.com**.