The Environmental Impact of Right-Sizing Packaging

paccurate

Unpacking the Problem

Consumers are receiving more packages than ever, and businesses are also sending them something they didn't order: a box of air. **The average shipment contains up to 64% air in some product categories**, far higher than the mere 25% of empty space per package which ecommerce executives have estimated[1] in a recent survey.

All that air is a big problem at scale. Fast, reliable, round-the-clock delivery is something we're accustomed to, and it's big business - US carriers generated $198 billion in 2022, delivering 58,000,000 packages every day. While growth in the industry was accelerated by the pandemic there's no sign of this slowing down, with volume expected to increase 2x pre-pandemic levels by 2024.[2]

With the rise of ecommerce and home delivery services, **the average person receives 64 packages per year, and over 90% of those are shipped in corrugated cardboard**.[3] The majority are recycled and turned into more boxes, but the wider logistical process is highly inefficient and severely harms the planet, as well as commercial revenue.

Mostly-empty packages may be simply not be an inconvenience to many consumers receiving small packages, but at scale it has a huge impact on our planet and our pockets. While other delivery methods are available or have been trialed the traditional method (a driver in a truck) is still the only feasible option for final mile. Air freight is prohibitively costly, and new technology like drones or autonomous delivery robots are not viable yet for the vast majority.

This inefficiency at scale and dependency on loading a truck ultimately leads to greatly increased CO_2 emissions, higher costs for businesses in the production/purchasing of materials, transportation, and carbon offsetting, all of which are inevitably passed onto the customer.

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The Enviromental Impact

Customers do not typically have the capability to decide the size of the box their package arrives in, and the burden of responsibility lies with retailers and logistics providers to reduce this level of waste and lessen the harm caused to the environment. By reducing the materials required per package, it minimizes the production need, reduces household waste, enables more packages to fit into each truck, and reduces the number of CO2-emitting vehicles on the road.

In addition to the financial cost of poor shipping practices, inefficiency is a significant factor in the vast emissions from delivery providers. The transportation network behind those 58M daily packages is responsible for 70% of the carbon footprint of the average package, according to UPS[4], with many companies being slow to take action to reduce this. As of 2020, Amazon alone was responsible for 60.64 million metric tons of CO2 emissions, up 19% from the previous year[5], and still targeting 2040 as their commitment to reach net-zero carbon. However aggressive growth and increased delivery requirements make those commitments more challenging to reach and place the environment at greater risk.

Focus should be placed on reducing the greatest sources of emissions, rather than financial investments over a 20-year period to meet a net-zero figure. The number of delivery vehicles on our roads is expected to increase by 36% in 2030, and this demand on the network means that **transport is set to be the biggest source of new greenhouse gas emissions in the decades until 2050[5], all while approximately half of each package is full of air.** Oversized packages mean we require more drivers to service the demand and reach customers' doorsteps, but each additional truck required is another source of emission (as well as operational cost to businesses), and increases the negative impact on our fragile environment.

However it's not just delivery, the packages themselves are also part of the problem. With production of cartons packaging emitting 718 lbs. of CO2 per ton[6], every half-empty package sent has an impact on our already warming planet. Despite greatly improved recycling habits, paper and paperboard still make up the largest portion of solid municipal waste (23%), with approximately 17 million tons going to landfill each year[7], and those online purchases delivered to our door every day are a large part of that. **Despite increased recycling trends, the average American still uses the equivalent of seven trees each year in paper and cardboard products.[8]**

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We Can Do Better:
Downsizing For Good

While large delivery providers are taking measures to reduce emissions, such as increasing usage of electric vehicles, there are other solutions which will have a greater impact. If the mode of transport for delivery can't change right now, retailers must look at what they can change: **right-sizing a box is the most impactful way to reduce its carbon footprint.**

Simply reducing the size of packages by limiting the amount of empty space in each box leads to multiple benefits to everyone throughout the supply chain, including the customer.

Helping the Planet Breathe

With transportation the highest contributor to carbon footprint, any action which reduces the number of delivery vehicles on the road is key. A solution like Paccurate enables suppliers to do exactly that - **by calculating the most efficient packing method, the average box can be made 14% smaller.**

If a standard pallet contains 60 boxes[9], by right-sizing these boxes an additional 8 boxes fit on a single pallet, scaling up to an additional 80 boxes (or 1.3 pallets worth) per container. By making better use of the space available, we can greatly reduce the requirements of the highest CO_2 emitting factor: the transportation network. **With the forecast growth of shipping volumes, reducing the size of boxes would save 40,895,737 tons of global CO2 emissions in 2026.**

Protecting our Natural Resources

By reducing box sizes by 14%, Paccurate saves an average 1 square foot of cardboard per carton. If all packages in the US were cartonized using Paccurate, it would save the equivalent of 1.98 sq miles per day - enough to cover Central Park 1.5 times. By limiting materials to what's required, the production demand is reduced and enables us to slow down the irreversible damage caused to the environment every day.

This simple step of removing air from boxes can reduce cardboard production requirements enough to save one tree for every 19 people in the United States. That's a forest the size of Denver or Portland which can be protected just by increasing efficiency, with no tangible difference to the service or product a customer receives at their door. While many businesses are committed to planting trees in line with product sales, the best solution for our planet is to reduce deforestation and protect what we already have.

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We All Win

Placing packing efficiency under the spotlight highlights potential benefits for both customers and businesses. For a business fulfilling 25,000 orders per month, Paccurate's cartonization platform can save an estimated $714,000 per year. Smaller packages mean more boxes per truck, which means fewer trucks on the road, and lower operational costs for vehicles and staff (in addition to the lower emissions and reduced cost of packaging materials).

As well as the immediate cost savings, this can also drive sustainability goals for businesses of any size: paying for carbon offsetting has become common practice, but reducing the initial carbon emissions is the most immediate way of reaching these goals. It also provides a further financial incentive, carbon offsetting may have cost just $2.50 per ton in 2020, however this could increase fifty-fold by 2050, up to $215 per ton, potentially becoming unsustainable for many businesses[10].

Customers will also see the benefits from receiving Paccurate optimized packages. As well as potential lower shipping fees, a box 14% smaller means a significant reduction in the 17 million tons of material currently going to landfill each year, enabling customers to reduce their own individual carbon footprint.

In Conclusion

As consumers, we now expect to be able to place an order online and receive it at our front door within days from anywhere in the world, an expectation which the pandemic accelerated further. While there have been incredible leaps forward in warehouse and logistics technology which enable this, in most cases we still rely on the most traditional method of delivery — a truck driver delivering a box to our door — and it's the most inefficient stage of the whole product journey. **Businesses are delivering packages which are half empty, reducing their delivery capabilities and increasing costs while causing rapid and permanent damage to the planet.**

Advanced cartonization systems which integrate into current warehouse and fulfillment systems can make a tangible difference in protecting the planet for future generations, while making businesses more sustainable, cost-efficient, and provide a better end product to customers.

The best things come in small packages, and making every package the right-size is now achievable for any business.

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