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SCIENCE

# E-Commerce: Convenience Built on a Mountain of Cardboard

By MATT RICHTEL FEB. 16, 2016

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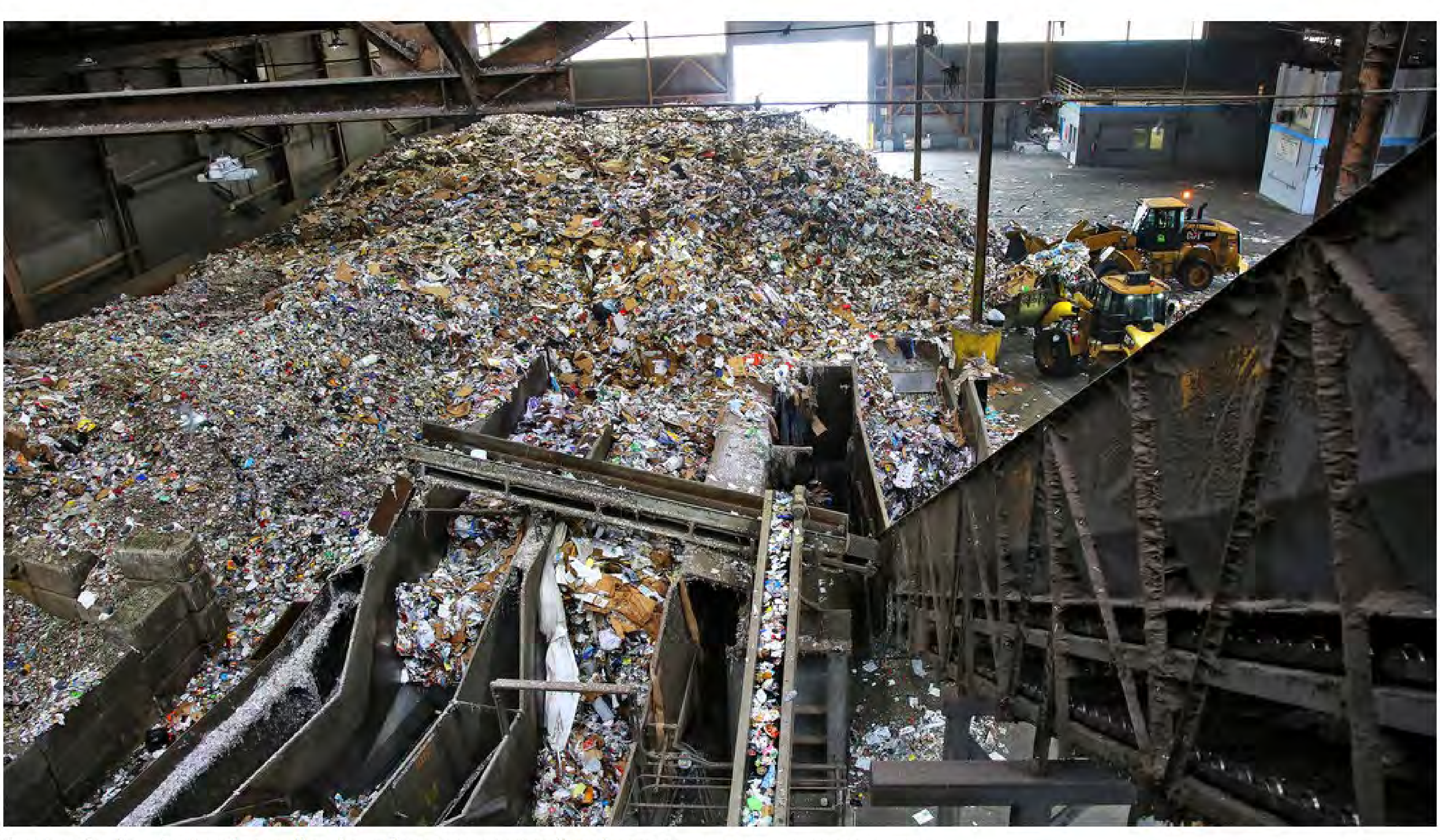
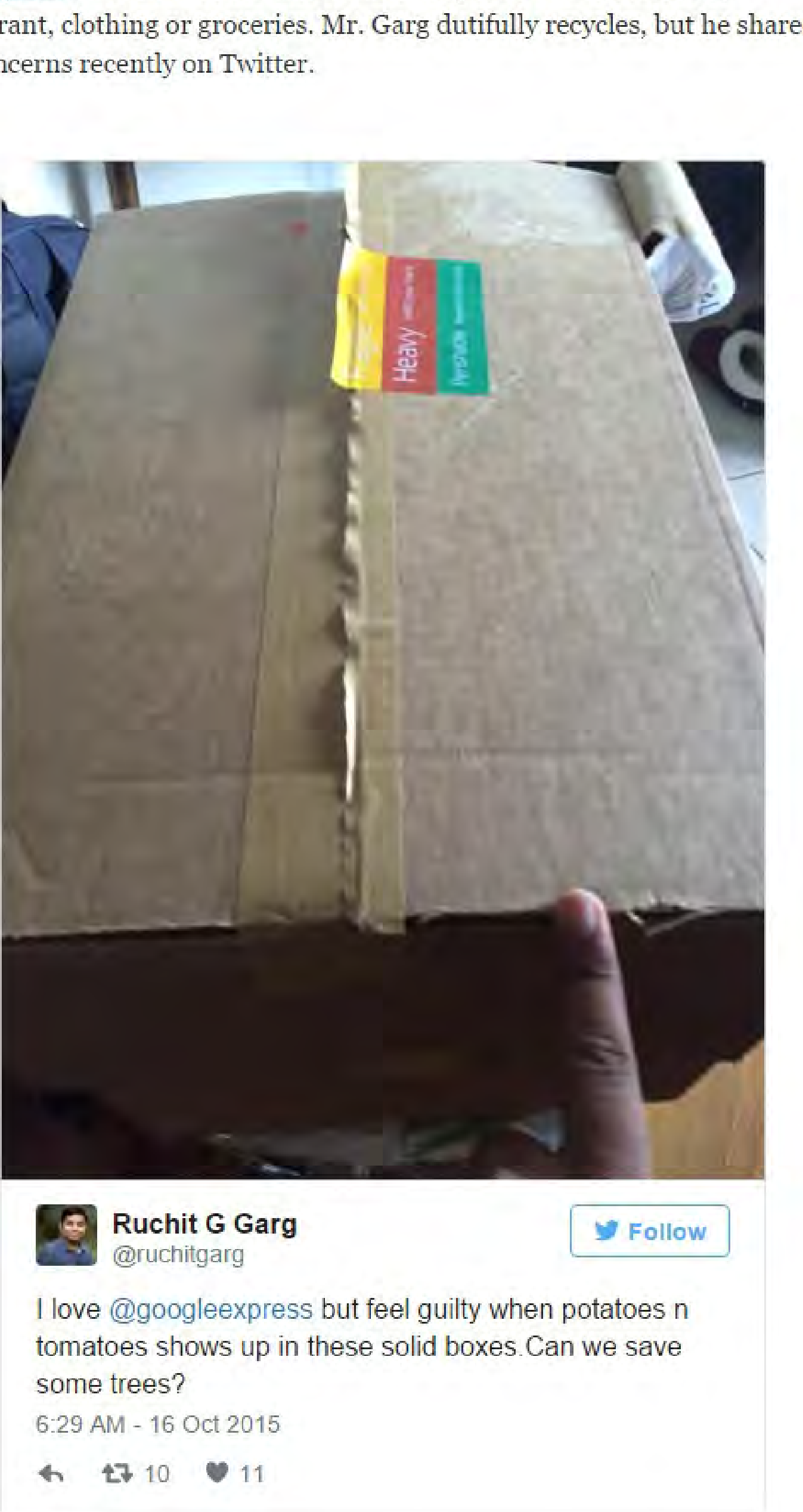


Recology, San Francisco's main recycling plant collects 100 tons of cardboard every day. Jim Wilson/The New York Times

Ruchit Garg, a Silicon Valley entrepreneur, says that he worries that something isn't right with his Internet shopping habit. With each new delivery to his doorstep — sometimes several in a day — he faces the source of his guilt and frustration: another cardboard box.

Then, when he opens the shipment, he is often confronted with a Russian nesting doll's worth of boxes inside boxes to protect his electronics, deodorant, clothing or groceries. Mr. Garg dutifully recycles, but he shared his concerns recently on Twitter.



Ruchit G Garg
@ruchitgarg
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I love @googleexpress but feel guilty when potatoes n tomatoes shows up in these solid boxes.Can we save some trees?

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A handful of scientists and policy makers are circling the same question, grappling with the long-term environmental effect of an economy that runs increasingly on gotta-have-it-now gratification. This cycle leads consumers to expect that even their modest wants can be satisfied like urgent needs, and not always feel so great about it.

The new arms race for Internet retailers is speed, making the old Federal Express commercial, "When it absolutely, positively has to be there overnight," seem as quaint as delivery by horse and buggy. Amazon boasted in a news release in December about its "fastest order delivered to date" — a Miami customer's craving for a four-pack of Starbucks vanilla frappuccino was sated in 10 minutes flat.

In 10 major regions, Google Express delivers in a little less than two hours from dozens of stores — including toys, drugs, hardware and pet supplies. Postmates, a San Francisco start-up, promises deliveries in less than an hour. It dropped off nearly one million packages in December.

Over all, the $350 billion e-commerce industry has doubled in the last five years, with Amazon setting the pace. Its Prime membership service has grown to more than 50 million subscribers, by one estimate. (And its new faster service, Prime Now, can "get customers pretty much *anything* in minutes," its website says).

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Uber calls its new UberRush service "your on-demand delivery fleet"; Jet Delivery offers "white glove" service in less than two hours; Instacart can deliver groceries to your door in less than an hour.

The environmental cost can include the additional cardboard — 35.4 million tons of containerboard were produced in 2014 in the United States, with e-commerce companies among the fastest-growing users — and the emissions from increasingly personalized freight services.

"There's a whole fleet of trucks circulating through neighborhoods nonstop," said Dan Sperling, the founding director of the Institute of Transportation Studies at the University of California, Davis, and the transportation expert on the California Air Resources Board. He also is overseeing a new statewide task force of trucking companies and government officials trying to reduce overall emissions from freight deliveries, including for e-commerce.

Dr. Sperling said that consumers shared as much responsibility for the environmental cost of the deliveries as the companies that provided the speedy services.

"From a sustainability perspective, we're heading in the wrong direction," he said.

But measuring the effect of the cardboard economy is more difficult.

E-commerce was responsible for much of the 35.4 million tons of containerboard produced in 2014 in the United States. Jim Wilson/The New York Times

There are possible trade-offs, for example. As people shop more online, they might use their cars less. And delivery services have immense incentive to find the most efficient routes, keeping their fuel costs and emissions down. For its part, Amazon said that delivering to consumers straight from huge warehouses cuts down the need to distribute to thousands of stores.

So far, though, shoppers appear to be ordering online while still driving to brick-and-mortar stores at least as much as in the past, according to Dr. Sperling and other academics. One recent study explored the environmental effect of Internet shopping in Newark, Del., and found that a rise in e-commerce in recent years by local residents corresponded to more trucks on the road and an increase in greenhouse emissions.

Ardeshi Faghri, a professor of civil engineering at the University of Delaware, said the increase of various emissions — which he estimated at 20 percent from 2001 to 2011 — "could be due to a multitude of reasons, but we think that online shopping and more delivery trucks are really one of the primary reasons."

"Online shopping has not helped the environment," he said. "It has made it worse."

Other scholars say that, at least for now, online shopping appears to be complementing brick-and-mortar shopping, not replacing it.

"People who shop online also like to see and feel things," said Cara Wang, an associate professor at Rensselaer Polytechnic Institute who studies transportation issues and has written a paper about habits of online shoppers. "And they have to return things."

Dr. Wang and other researchers say the demand for instant delivery, in particular, creates challenges for trucking companies trying to be efficient. Instead of taking big truckloads to single retailers they now make more scattershot deliveries.

Many drivers deliver just one item. This is often the case for Postmates, which has a fleet of 15,000 freelance drivers signed up to make deliveries of whatever the customer orders — an Uber-like service, but for deliveries. The cost typically starts at $5, and a 9 percent service fee applied to the cost of the item. (The company says it also has about 5,000 deliverers who go on bike or foot in dense urban areas).

Ruchit Garg and his 3-year-old son with produce ordered online through Google. Jim Wilson/The New York Times

And the push for speed from marketers gives shoppers little incentive to wait.

"Why select one week if I can get it in one hour?" asked Miguel Jaller, an assistant professor at U.C. Davis who studies urban freight patterns.

Such is the case for Monica Rohleder, who admits to using Amazon Prime so much that "my husband jokes we keep Amazon in business."

Ms. Rohleder, who lives in Los Angeles and works at a public relations firm, said she liked overnight delivery, but "within a couple of hours is best" because she is busy with work and her two young children. So she often does not order something until it's urgent. "There's the immediate gratification of getting something and checking it off your list," she said.

One afternoon she received six boxes, from Amazon and Nordstrom, for a Hawaii trip, including bathing suits, workout clothes and coloring books. Some of the clothes did not fit, so she returned them.

She thinks more about the cardboard that comes into her house than the truck emissions, she said. "It's embarrassing," she added of her mass of weekly recycling.

Dennis Colley, the president of the Fibre Box Association — the trade group for the corrugated paper, or cardboard, industry — estimated that the use of boxes for e-commerce was growing faster than most other market segments. However, he emphasized the industry's efforts to be environmentally conscious, and that 90 percent of corrugated packaging were recycled.

Amazon is aware of the cardboard issue. Since 2009, it has received 33 million comments, ratings and photographs about its packaging as part of its "packaging feedback program." Amazon said it used that feedback to make sure that cardboard box size was consistent with the size of the product. It also works with manufacturers to send some products without additional cardboard packaging, said Craig Berman, a company spokesman.

Though recycling can make consumers think they are helping the environment, the process has its own costs, including the emissions from shipping it to recycling centers, which use a lot of energy and water. Don Fullerton, a professor of finance and an expert in economics and the environment at the University of Illinois, said one possible solution would be to make the retailers responsible for taking back the boxes. That would create incentives for them to come up with solutions for less packaging.

"And maybe not put a box inside a box inside a box," he said

Robert Reed, a spokesman for Recology, San Francisco's main recycling processor, which collects 100 tons of cardboard every day, has a simpler solution: "Slow down consumption," he said. "Slow down."

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A version of this article appears in print on February 16, 2016, on page D1 of the New York edition with the headline: A Convenient Truth. Order Reprints | Today's Paper | Subscribe

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