

WHITE PAPER
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DOES SHOPPING BEHAVIOR IMPACT SUSTAINABILITY?

The environmental and
socioeconomic impact of mall
and online shopping behaviors

An Update to the 2016 Study

Background

In 2016, to better understand the environmental impacts of online and brick-and-mortar shopping, Simon engaged Deloitte Consulting, LLP to conduct a study creating a Life-Cycle Analysis (LCA) that examines the environmental impacts of all material, energy, and waste attributable to a product in its life cycle. To ensure comparability, the LCA assumes the consumer purchased the same basket of goods online as they would in a brick-and-mortar location.

This year, Simon updated the analysis to incorporate trends in shopper behaviors for both online and mall shopping. According to the study's results, shopping at a mall can be up to 60% more sustainable than shopping online. An increasing rate of product returns from online purchases, more products purchased per trip, and trip chaining to the mall contribute to lower emissions associated with brick-and-mortar shopping. This is nearly three times the difference from three years ago.¹

With this study, we wanted to look outward and better understand the sustainability impacts different shopping behaviors have on the environment. Gaining a better understanding of this will help us prioritize sustainability initiatives differently, engage tenants with new ideas, and communicate with shoppers. Throughout this analysis we have engaged with key external stakeholders and have received valuable feedback that we appreciate.

We hope you enjoy this report and welcome your feedback. Questions can be directed to sustainability@simon.com.

"Throughout this report Simon has demonstrated consistent commitment to utilizing rigorous life-cycle assessment methodology and report process transparency. In addition, for assumptions made in the report, Simon utilized a data-driven approach, including use of their own retail data. As a result, the report achieves credibility that allows consumers to understand the impacts of shopping behavior. For retail and real estate industry leaders, the report credibility provides a comprehensive analysis that creates a useful foundation to help advance sustainability initiatives through the value chain."

— **Kyle Tanger**, Director Sustainability and Energy
Deloitte Consulting LLP

1 In the original 2016 analysis, Simon found online shopping to have a 7% greater greenhouse gas impact than mall shopping for the same basket. Because of changes to customer visit data and U.S. EPA greenhouse gas emissions factor methodologies, Simon updated this analysis to be compliant with life-cycle assessment protocol and revealed a 23% larger greenhouse gas footprint for online shopping.

DOES SHOPPING BEHAVIOR IMPACT SUSTAINABILITY?

“Is there a difference in how I buy products?” or “What is the environmental impact of buying products online versus in a mall?”

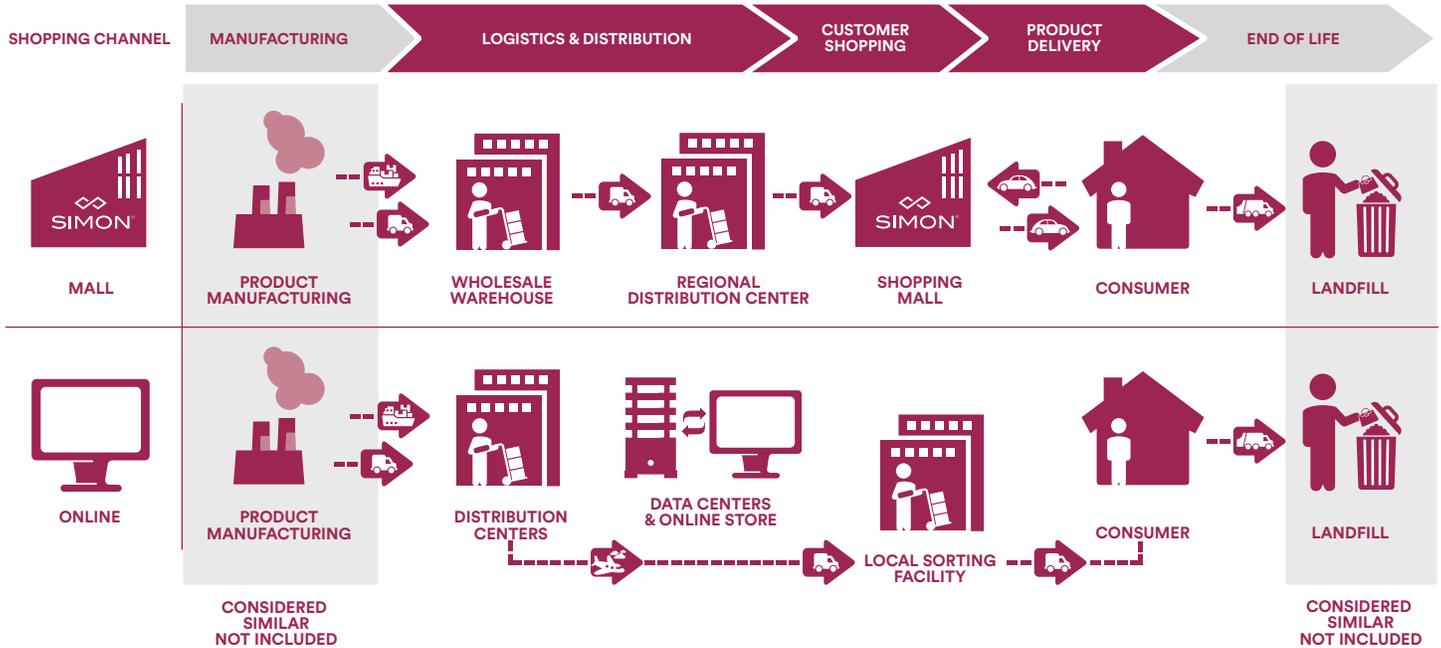
Today's shoppers have more choices to purchase a wide variety of product than ever before. They can go to the nearest mall, order things online, or even order online and pick up in-store. They also have more options for returning items—shoppers can mail them back or return to a nearby store. Whatever the case, consumers now have the ability to shop for "anything, anywhere, anytime."

While retailers work hard to deliver convenience and evolving expectations, shopping behaviors do have environmental and socioeconomic impacts. Nationally, malls represent greater than 50% of U.S. retail sales, and given the numerous shopping options today, an increasing number of shoppers are concerned about the environmental impact of shopping.

At Simon, sustainability is an important consideration for our leaders, employees, and customers alike. Understanding these sustainability impacts helps to formulate strategies to best serve mall guests and retailers within our properties. The Simon team has been focused on the environmental impact of shopping and developed a data-driven methodology to understand the sustainability impacts of online versus mall shopping.

To understand the environmental impacts, Simon, in conjunction with research partner Deloitte Consulting, used a “cradle to grave” Life Cycle Analysis (LCA) which examines the environmental impacts of all material, energy, and fuels attributable to a product or service in its life cycle. The research examined a combination of four retail products’ journey from their manufacturing to their end of life when shopped in a mall or online. The four products selected include: women’s tops, women’s shoes, coffee makers, and wine glasses. Referred to as the “basket of products,” these products were chosen based on Simon data on typical customer purchases. Many products are manufactured in the same way, regardless of how consumers buy them, thus the study was designed to be purely comparative in nature and only measured the aspects of a product’s footprint that were different. Green House Gas (GHG) emissions were used as the environmental measure because they are the cause of climate change. The main contributors that affect the level of GHG emissions in either shopping experience include transportation fuels, building energy usage, and packaging differences. Using GHGs was an effective way to combine multiple impacts into an easier to understand format. The life cycle of how products are typically created, transported, and sold in a mall and online is illustrated in Graph A1.

Graph A1



The research focused on the life cycle phases that have differences between mall and online shopping, and it took into account what is happening within each life cycle phase. For example, it considered the average type of car people would drive to the mall; the number of people who would drive together to the mall; and the idea that shoppers trip chain, which means combine, mall shopping trips with other errands. For online shopping, the research considered issues like product returns. Shoppers generally buy multiple sizes of the same product and online retailers enable more product returns by often offering free returns. Table A1 illustrates the differences.

Table A1

	PHASE	MALL	DIFFERENCE	ONLINE
LOGISTICS & DISTRIBUTION	Delivery & Logistics	Fuel consumed in transporting the goods from the wholesale warehouse to the mall		Fuel consumed in transporting the goods from distribution center to local sorting facility
		Energy consumed in the regional distribution center		
CUSTOMER SHOPPING	Customer Interface	Energy consumed in the mall		Energy consumed at the data centers and in using personal devices such as desktop computers required to support customer's online shopping
PRODUCT DELIVERY	Packaging	Individual product packaging, i.e. shopping bags		Individual product packaging used to send products, i.e. corrugated boxes, bubble wraps, etc.
	Product Acquisition	Fuel consumed in customer travel to the mall and back for shopping		Fuel consumed in the last mile delivery
	Returns	Fuel consumed in customer travel to return the products bought		Fuel and data center and personal device energy consumed in returning the product using delivery to return to distribution center



WHAT'S THE BIG PICTURE?

The research showed that if all of the people who come to a mall each year were to purchase a combination of four products, it would result in an average of 26.7 million products bought every year from an average mall.¹ The results of the LCA show that each year, online shopping has a 60% larger negative environmental impact than mall shopping if shoppers bought the same number of products (i.e. 26.7 million) in a brick-and-mortar mall. This is summarized in Table A2.

Table A2

ENVIRONMENTAL IMPACT - MALL SHOPPING	DELIVERY & LOGISTICS	CUSTOMER INTERFACE	PACKAGING	PRODUCT ACQUISITION	RETURNS	TOTALS
TOTAL AVERAGE EMISSIONS (MTCO _{2e})	10,408	10,264	574	18,032	6,633	45,911
% AGE OF TOTAL	23%	22%	1%	39%	14%	

ENVIRONMENTAL IMPACT - ONLINE SHOPPING	DELIVERY & LOGISTICS	CUSTOMER INTERFACE	PACKAGING	PRODUCT ACQUISITION	RETURNS	TOTALS
TOTAL AVERAGE EMISSIONS (MTCO _{2e})	17,627	3,153	4,403	32,003	16,262	73,447
% AGE OF TOTAL	24%	4%	6%	44%	22%	

Mall shopping shows 60% less GHG emissions

THE TOTAL DIFFERENCE BETWEEN MALL SHOPPING AND ONLINE SHOPPING IS 27,536 (MTCO_{2E}). THIS SHOWS 60% LESS GHG EMISSIONS ATTRIBUTED TO MALL SHOPPING.



67 million miles driven by an average U.S. passenger car

THE IMPACT DIFFERENCE IS THE SAME AS:



68,000 incandescent lamps replaced with LEDs

All emissions in Table A2 are in metric tons of CO_{2e}

The research provides insights into why mall shopping has a smaller environmental impact compared to online shopping. Among the findings are:

- Mall shoppers buy on average 3.5 products per trip and visit other places on their way to the mall. This is often referred to as trip chaining which lowers emissions for each trip to the mall because you are allocating transportation to multiple purposes.

¹ Number of visitors to an average mall annually x percentage of adult visitors x percentage of adults shopping x average number of products bought by an adult = 26.7 million

- Shopping online leads to five times more returned products which considerably increases the environmental impact. An extensive literature search shows that approximately 40% percent of online purchases are returned versus 7% in the case of brick and mortar.
- Shopping online creates five times more emissions from packaging for online orders (corrugated boxes, bubble wraps, etc.) compared with the emissions associated with the use of plastic/paper bags consumers bring home from the mall.

An additional consideration of the analysis was the impact of quick home delivery through online shopping. While the use of air freight has increased in recent years, and much of this is attributed to the growth in e-commerce, there is incomplete data on whether the percentage of home deliveries using air freight has increased. Therefore, this element that could have added GHG emissions to online shopping was excluded from the analysis until more detailed data is available.

Furthermore, the physical presence of malls in the local economy provides jobs and taxes (sales and property tax) to your local economy. The research shows that physical retail generates five times more jobs than online shopping for the same value of sales.² Each mall can generate anywhere between a few hundred-thousand to a hundred-million dollars worth of sales and property tax in a year depending on the size of the mall and mall sales.

WHAT DOES THIS MEAN FOR ME?

The study provides insights for consumers to consider when it comes to how their shopping habits may impact the environment. Table A3 details the differences between mall versus online shopping, and notes the impact of product returns. Product returns are more common when customers purchase products online versus in the mall, and the environmental impacts can really add up. Specifically, if shoppers buy four products online and return two because they do not fit or the color wasn't right, the impact is 70% higher compared with buying the same products at the mall and not having to return them because they have been tried on. That's a big difference.

Table A3

NO. OF PRODUCTS BOUGHT	NO. OF PRODUCTS RETURNED	SHOPPING CHANNEL	TOTAL EMISSIONS IN g CO2e
4	0	Mall	6,719
4	1-4	Mall	10,089
4	1	Online	10,071
4	2	Online	11,590

 Each symbol represents 1,000 g CO2e

Additionally, a visit to the mall often includes other activities such as dining, errands, and other forms of entertainment. If done separately (either online or physically), these additional activities add more energy and fuel emissions. Going to the mall usually involves social interactions with family and friends, providing personal social interactions and memories.

Previous studies comparing mall and online shopping have mostly compared emissions from buying one item from one channel versus the other. This study uses proprietary customer information to create a realistic representation of shopping behaviors and tests the dependence of the results on variables. Consideration on how a basket of products, distances traveled to the mall, how many people travel together, other stops during a trip to mall shopping, and product returns all factor into this holistic analysis. Touching on socioeconomic issues showcases the impact real estate has on local economies and society.

CONCLUSION

In analyzing shopping data that represents actual customer behaviors for mall and online shopping, Simon has shown that mall shopping represents a better sustainability performance over online shopping. Furthermore, in an age when consumers are increasingly demanding quick delivery, which requires more resources such as fuel to fulfill, the negative impact of online shopping is likely to worsen even more. Put simply, the choices customers make regarding how they buy products and how they utilize product return options have clear impacts on the environmental footprint.

Simon continues to invest in and improve its malls. Simon's legacy of environmental and energy leadership is something we are proud of, but more importantly, it motivates us to improve even more in the future. Some prime examples include Simon's focus on new lighting, energy efficiency updates, options for electric cars, and many more innovations. We know these options are important to shoppers, and they are important to us. Please read more about our sustainability initiatives at simon.com/sustainability.

