



THE ENVIRONMENTAL IMPACT OF HOME DELIVERIES

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YOUNG REVIEWER:



UMBERTO

AGE: 12

Many people buy things online these days, like the latest sneakers or electronic gadgets. These goods may be sent to us over very long distances. The various ways of shipping those goods to us, whether by air, sea, or land, produce different amounts of greenhouse gases and therefore have different impacts on global warming. If we compare different ways to ship goods from China to Singapore, we find that shipping by air is faster than by sea, but it is also more expensive and contributes more to climate warming. We asked 188 people which shipping method they would choose if they knew about the greenhouse gas impact of each method. Slightly more than half were willing to accept slower deliveries for less polluting alternatives. Offering carbon labels on online shopping websites could help to reduce the environmental impact of home deliveries.

CARBON EMISSIONS

Greenhouse gas emissions, or the addition of greenhouse gases to Earth's atmosphere, mostly due to human activities.

GREENHOUSE GASES

Gases that trap heat in the Earth's atmosphere and warm the planet, which include carbon dioxide, methane, nitrous oxide and fluorinated gases.

E-COMMERCE

Buying and selling of goods and services over the internet.

CARBON DIOXIDE EQUIVALENT (CO₂e)

Aside from carbon dioxide (CO₂), there are other greenhouse gases, such as methane. CO₂e is a standard unit to represent the global warming effect of all greenhouse gases.

INTRODUCTION

Online shopping has become very popular, partly because it is often easier and cheaper to buy the things we need and want over the internet. About one-fifth of things bought online come from outside the buyer's country. While buying things from other countries allows us to access a wide range of products, sending these goods from one country to another requires a lot of energy and results in **carbon emissions** in the form of the **greenhouse gases** that contribute to a warming planet.

When we shop online, we can often choose from several delivery options, and to help us make that choice we are usually given information about delivery time and cost. If we want a faster delivery, it usually costs more. If we are willing to wait a little longer, we can pick the cheaper or free delivery option. But there is another important way in which the delivery options are different, and that is in the carbon emissions that they generate. For example, sending a parcel using an airplane is faster than using a ship or a truck, but airplanes produce a different amount of greenhouse gases than ships or trucks do. Just how different are the carbon emissions for each shipping method?

SLOWER DELIVERIES HAVE LOWER EMISSIONS

We compared the various shipping options available on a popular online shopping website in Asia called *Taobao*. *Taobao* operates in over 200 countries, and it has more than a billion products listed on its website, most of which are from China. Let us look at the case of an order placed on *Taobao* that must be shipped from China to Singapore. Singapore is a tropical island city-nation located in Southeast Asia. Since it is an island, more than half of **e-commerce** purchases are for goods brought into the country from abroad, instead of from within the country.

After an order is placed on *Taobao*, the goods are to be delivered from China to Singapore, which is located about 2,500 km (1,500 miles) away. At the start of a delivery, trucks are usually used to deliver the item from the seller to a port and from a port to the buyer at the end of the delivery. In the middle, however, the item can go through the air from one port to another, or over the sea. Figure 1 shows the journey made by the parcel and the different modes of transport the parcel could take to get from the seller to the buyer's doorstep.

We discovered that delivering a small parcel by sea is less polluting than delivering it by air. We estimate that delivering by sea produces about 1.2 kg of **carbon dioxide equivalent (kg CO₂e)**, which is a measure of the amount of greenhouse gas emissions. It would take a mature tree about 3 months to remove the same amount of carbon dioxide from

Figure 1

The long journey taken by a parcel from a seller in China to a buyer in Singapore. The parcel origin is the location of the seller (where the parcel comes from) and the parcel destination is the buyer's doorstep. In between, the parcel could travel by truck, van, and sea or air.

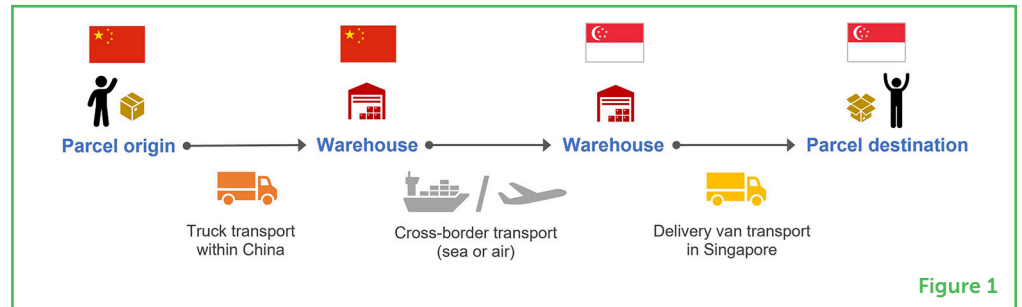


Figure 1

the atmosphere through photosynthesis [1]. However, the amount of emissions from delivery by air is almost 6 times greater than by sea. Figure 2 illustrates the emissions from each stage of each delivery option for the delivery of a 1 kg parcel.

Figure 2

Comparison of carbon emissions for shipping a single 1 kg parcel by sea vs. by air, measured in kilograms of carbon dioxide-equivalent. Shipping by air results in much higher emissions.

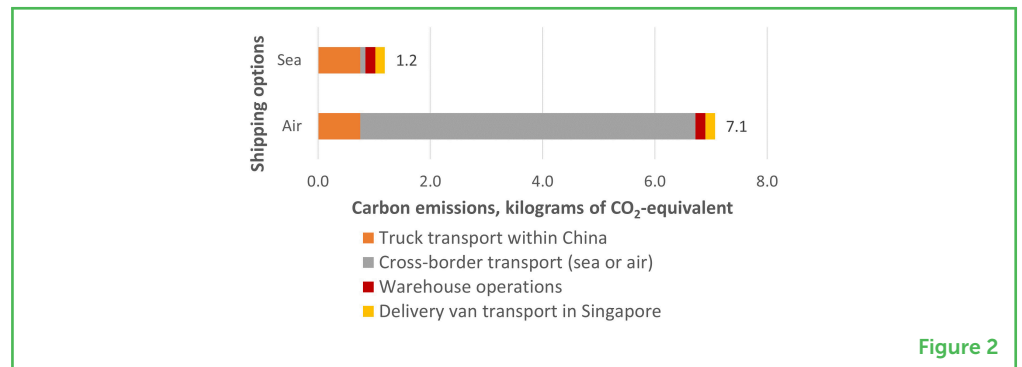


Figure 2

The lower carbon option is also the slower and cheaper option. If consumers can wait, they can save money *and* reduce the carbon emissions from delivery by at least 80%, by opting for sea instead of air. However, this switch would mean an additional waiting time of about 5 days, which is 1.5 times the wait for air delivery.

WHAT IF CARBON FOOTPRINT LABELS WERE OFFERED?

If online shoppers knew about the carbon emissions of a company's shipping options, would they choose differently? Our hypothesis was that placing these **carbon footprint** labels next to shipping options will lead consumers to make more informed choices and to think more carefully about the environmental impact of those choices.

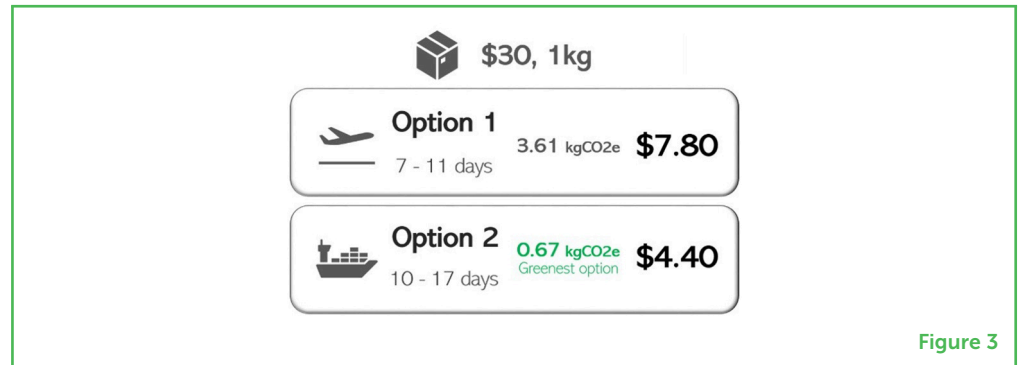
To validate this hypothesis, we surveyed some people living in Singapore in June and July 2020. We showed them different pairs of possible shipping options, some with the carbon labels and some without, and then asked which they would choose. Figure 3 shows an example of a choice presented to them, which includes carbon labels.

CARBON FOOTPRINT

The amount of greenhouse gases produced because of one's activities.

Figure 3

We presented people with a survey of shipping options that included carbon labels like this example. We found that slightly over half of the respondents were willing to choose the “greener” method, even though it meant waiting longer for their deliveries.



Out of 188 survey respondents, slightly over half (55%) were willing to accept a longer wait for the less polluting alternative. This means most people would be happy to allow more time for their parcel to arrive, knowing that this results in less carbon emissions. These results offer evidence that the presence of carbon labeling might influence shoppers’ choices of online shipping options. Similarly, other researchers have found that offering simple, well-designed carbon labels for products like certain foods can shift consumers away from higher-emission options [2].

PROMOTING SUSTAINABLE E-COMMERCE

Since emissions can be very different for various shipping options, online shoppers may not be aware of the climate impact of their choices and unknowingly opt for less sustainable outcomes. Carbon labels can help shoppers to make more informed choices.

Many people, including the young, care about climate change. They would like to take actions to protect the planet’s climate and to play a part in reducing carbon emissions. Giving people the information to make the most environmentally friendly shipping choices helps to minimize emissions. Carbon labels, like the one explored in this study, can guide people toward behaviors that will better protect our planet.

ORIGINAL SOURCE ARTICLE

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YOUNG REVIEWER



UMBERTO, AGE: 12

My name is Umberto. I like to study science, read manga and play videogames with my friends. I love going to the beach to playing with sand, adventures and drawing cartoons. In the future I would like to become a physicist.

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Lynette Cheah studies how big cities can promote cleaner, more efficient transportation systems for all. She builds computer models of how people and goods move around and tracks the resultant energy use and emissions. She enjoys going on walks or bicycle rides with her family. She is an associate professor of engineering systems in the sunny, tropical city of Singapore. *lynette@sutd.edu.sg

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