E-Commerce and the Circular Economy

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Abstract

The genesis of E-commerce may be traced to the 1960s when businesses started using Electronic Data Interchange (EDI) to share business documents with trading partners. The internet boom in the 1990s and the rise of online marketplaces such as Amazon, eBay and Alibaba have revolutionized the E-commerce industry. B2C E-commerce, boosted by high internet and mobile penetration globally have significantly impact consumer buying and consumption habits.

As the E-commerce market grows, so does its impact to the environment. One approach towards minimizing the negative impact of E-commerce to the environment is to introduce circular economy practices into the E-commerce ecosystem. The idea behind circular economy is to "close the loop" i.e. minimize waste and promote the continual use of resources through reusing, reconverting and recycling.

However, worldwide adoption of circular economy practices is still in its infancy and more awareness and legislation would be required.

Keywords

E-commerce, B2C, Circular Economy, Reuse, Recycle, Reconvert, Environment, Emissions, Sustainability

Circular Economy – an armchair introduction

A circular economy is an economic system aimed at eliminating waste and the continual use of resources [1]. A circular economic system is regenerative in nature, as opposed to the traditional linear economy, which has a "take → make → dispose" model of production. Figure 1 illustrates the difference between a linear economy and a circular economy. In a circular economy, waste is treated as a resource that must be managed, typically in the following pecking order:

1. **Reduce**– this is the most important step in the circular economy. Less waste will result in less items to be handled and repurposed for reuse or reconverted for recycling
2. **Reuse**– whatever waste or by-product that remained in the ecosystem should be reused where possible
3. **Recycle**– any residual waste that cannot be reused, should be recycled or repurposed without having to draw down from fresh quantities of raw materials for production
4. **Dispose responsibly** – any residual by-product that cannot be recycled should be disposed off responsibly to minimize the impact to the environment

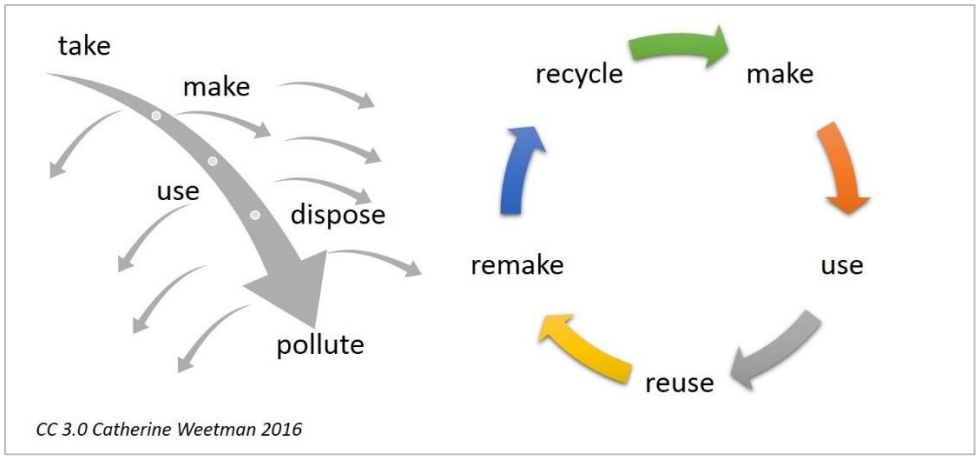

Figure 1 - Linear vs Circular Economy (Source: Wikipedia)

Environmental Impact of B2C E-commerce Growth

In 2019, retail E-commerce sales worldwide amounted to USD 3.53 trillion and expected to hit USD 6.54 trillion in 2022 [2]. Figure 2 depicts the actual and forecasted growth of E-commerce sales revenue worldwide. In Indonesia, approximately 4 million packages are delivered daily and this only represents about 1% of retail sales. E-Commerce growth has been fuelled by technology and the growing affluence of the population. Most online shoppers would state *convenience*, *better prices* and *access to a high variety of products* to be the top three reasons to shop online.

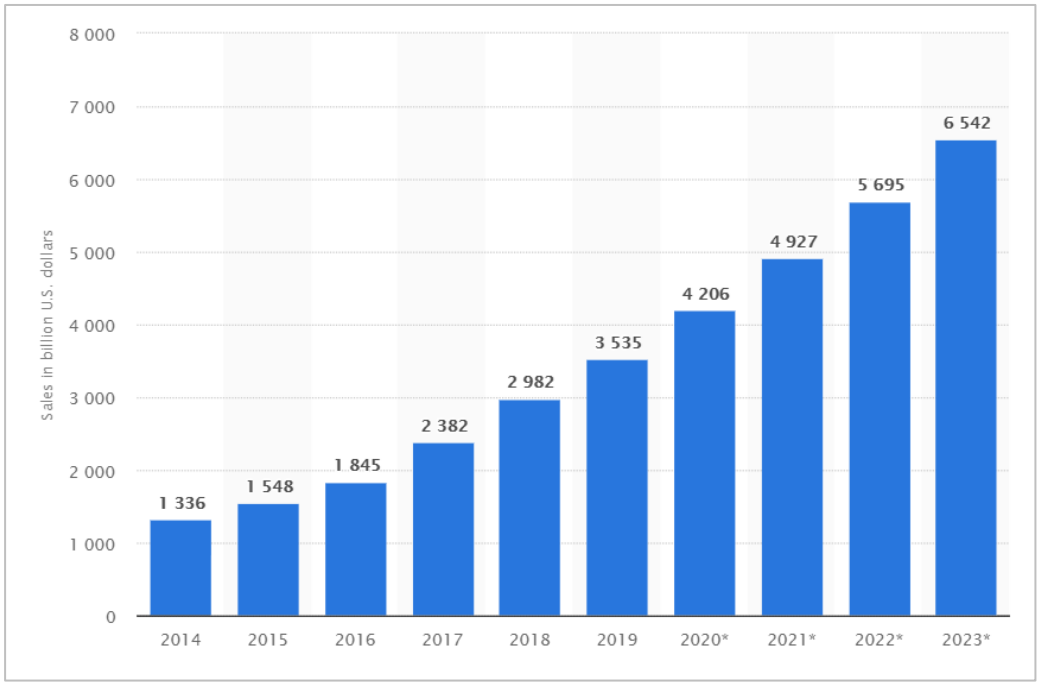

Figure 2 – Global retail B2C E-commerce sales worldwide (source: Statista 2019)

E-commerce waste generated from packaging materials

An undesirable side effect arising from B2C E-commerce growth is the piling up of packaging waste. A recent article by *Straits Times*, *Greenpeace* and other non-governmental bodies had said that volume of packaging materials used in E-commerce and express delivery sectors hit a staggering 9.4 million tonnes in 2018 and is set to reach 41.3 million tonnes by 2025 if the growth remains unabated [3].

Prior to E-commerce, the logistics relating to traditional retail were simple and linear i.e. goods were shipped in bulk to warehouses and eventually ended up in retail stores [4]. Unfortunately, the E-commerce business model does not offer the economies of scale that comes with bulk logistics systems. The logistics for E-commerce has four times as many touchpoints as regular retail where shipments are broken down into individual packages for delivery [5].

Impulse purchases and consumption

Massive discounts and sales events such as Amazon's Black Friday and China's 11.11 Singles' Day augment the risk of increasing transport-related emissions and packaging waste due to impulse purchases [6]. A shopper may opt to make an overseas purchase of similar but locally available products, due to a time-limited good deal.

Packaging wastage

Traditional product packaging, which is designed for in-store presentation is wasteful in E-commerce. There is no need to place attention grabbing graphics on packaging units – the online shopper would have already seen that on the online marketplace or from the e-tailers' website. E-commerce packaging should be "no frills" and more functional. Figure 3 highlights some packaging considerations for E-commerce shipments.

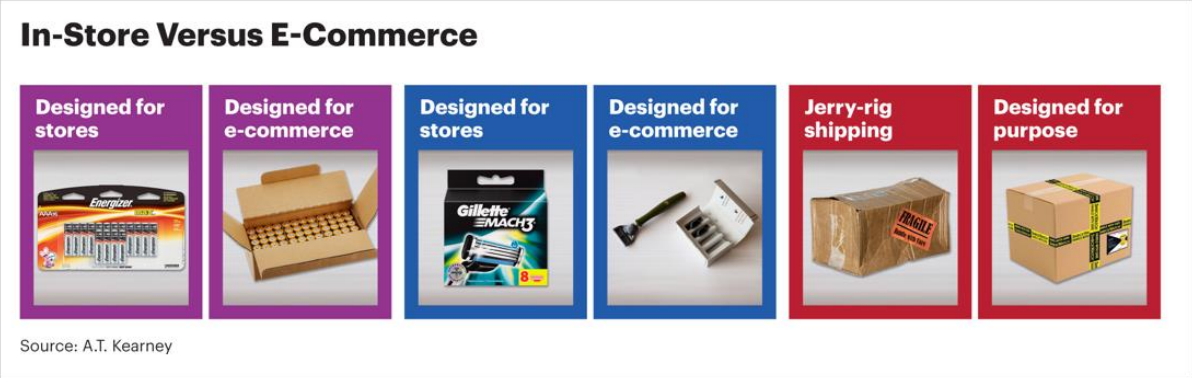

Figure 3 - In-store vs E-commerce packaging (source: A.T. Kearney)

Can we have standard-sized packaging?

I would like to recount a personal shopping experience from a large local online marketplace, who shall remain nameless. I ordered **one** small bottle of aromatherapy essential oil, probably about five inches in height and maybe one inch in diameter. Here's the shocker - when my item finally arrived, it came in a cardboard box large enough to fill up a dozen wine bottles! While standard size packaging helps with inventory management and transport planning, a large proportion of "air" in a box does not send a very eco-friendly message to the customer.

Figure 4 - What is wrong with this picture?

Reuse and Recycling issues

Most online platforms or e-tailers do not have a well-structured reuse or recycling programme. After a shipment has been delivered and unboxed, the consumer will typically discard the package and inner packaging materials. These discarded packages will eventually end up in landfills. According to the New York Times, "35.4 million tons of container board were produced in 2014 in the US, with E-commerce companies among the fastest growing users" [7]. The counter argument is that much of this packaging is recyclable. However, recycling itself has its own environmental footprint, which will keep growing to satisfy the "gotta-have-it-now" appetite [8].

Ever increasing carbon footprint

Theoretically, E-commerce is supposed to reduce CO_2 emissions because it nullifies the need for consumers to drive to the retail store to make purchases. However, the evidence is scarce – although people tend to buy more online, they still drive to retail stores and make purchases. An article from The New York Times opined that Home deliveries coupled with instant delivery expectations are far more challenging for trucking companies to be efficient. Instead of taking big truckloads to single retailers, they now make more scattershot deliveries [7].

Possible Solutions

According to Nithin Cocha from the *Triple Pundit*, what we need now is an E-commerce evolution, away from speed and towards sustainability [8]. In her article "E-commerce packaging waste becoming a bigger issue", Pam Baker highlights a multi-tiered approach towards tackling E-commerce packaging waste [9], as depicted in Figure 5.

Figure 5 - Framework for reducing E-commerce waste (Source: TechTarget)

Change in online buying behaviours

Consumers need to start behaving more sensibly and avoid impulse buying. 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 [7]. Delayed buying decisions generate consolidation opportunities for e-tailers, which will result in a lower packaging footprint through the reduction of external packaging, internal

packaging and labelling. Better consolidation will also result in lower emissions as trucking companies will be able to minimize the number of trips required to deliver the same number of items.

Reusable containers / cartons

For a reuse programme to be effective, the process of returning the container or carton needs to be convenient and hassle-free. Shipment data from online platforms and e-tailers can be aggregated to determine the state and inventory positions of reusable containers / cartons and shared with transporters and customers. Savings generated from reuse may be used to incentivise customers and transporters that participate in the said programme.

Sharing Economies

Sharing economy is peer-to-peer economic system where available capacities are sold and utilised on an opportunistic basis. ***AirBNB*** is a good example of a successful sharing economy, delivered on a global scale. Creative platforms such as XtayPro (www.xtaypro.com) takes advantage of unused baggage capacities of international travellers as a proxy to ship products not available at the destination country. The customer gets what s/he wanted, and the traveller gets subsidized for his or her trip as a reward for sharing his/her unused baggage capacity. Propelled by the growth of international tourist arrivals (see Figure 6), such a sharing economy concept can be leveraged to spread the use of air freight for E-commerce cargo, hopefully reducing overall CO_2 emissions.

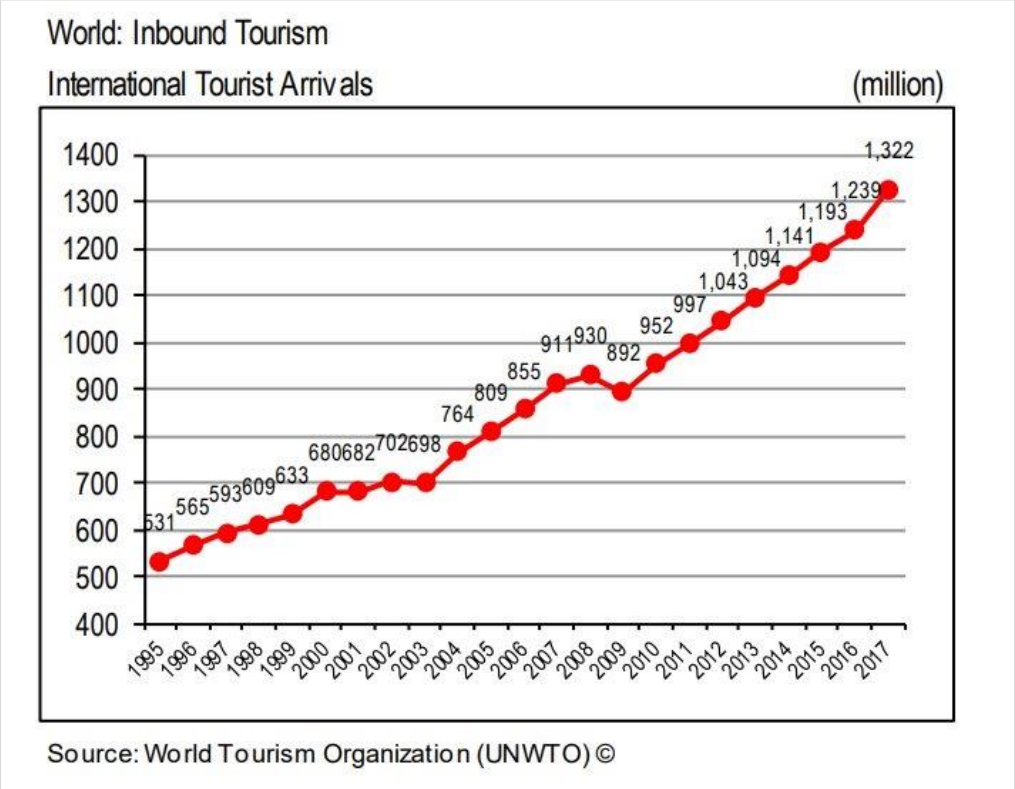

Figure 6 - The growth of International Tourist Arrivals

Repair vs Replace

If a problem can be easily identified and the repair process can be carried out in five steps or fewer, one will often find that repair is environmentally preferred to the impact of transporting new products from the store, disposing of the packaging and of the faulty product. Sites like YouTube, doityourself.com and ifixit.com provide a rich guide to a variety of different products that you can repair yourself [10].

Second-hand market

The second-hand market is expanding as decades of growth in consumer spending in China means there is a large pool of used goods with significant resale value. An important fact to note is that more than 60% of consumers in China's largest cities conducted their second-hand trades online. While this may look like a good use case for circular economy, more data and detailed study need to be carried out to determine the environmental footprint this secondary market is generating.

Salvage and Remake

Electronic Waste or e-waste is considered as some of the most harmful discarded items, despite their benign exterior [11]. According to a paper titled "The Global E-waste Monitor 2017" by the United Nations University, International Telecommunication Union and International Solid Waste Association [12], in 2016, 44.7 million metric tonnes of e-waste were generated. This is an equivalent of almost 4,500 Eiffel towers! Smartphones are one of the main contributors to the generation of e-waste and recent trends have indicated that online smartphone sales have surpassed instore sales [13]. Perhaps, all is not lost. Researchers led by Prof. Madhavi Srinivasan from The NTU Singapore – CEA Alliance for Research in Circular Economy (NTU Scarce) had found a way to extract precious metals used lithium-ion batteries. "By extracting valuable resources from used batteries, our method allows us to convert seemingly useless batteries that might be tossed or incinerated into new, usable batteries," Prof Srinivasan said, adding that the team will work on improving the machines and metal extraction processes [14]. As only 5-6 percent of spent lithium-ion batteries worldwide are recycled, more awareness and perhaps legislation are needed to push for the recycling of e-waste to become mandatory. Costs and economic viability remain key pushback factors towards adoption.

Conclusion

The E-commerce market will continue to grow and its impact to the environment cannot be ignored. Injecting Circular Economy concepts into the B2C E-commerce ecosystem is one way to minimize and repurpose waste generated from packaging, shipping and disposal. Today, online consumers are more discerning and well-informed and given a choice, many would choose a seller or platform that promotes eco-friendly practices. For circular economy to have a long-lasting impact, more effort needs to be expended on creating awareness and legislation.

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