

Original Article

A Review Paper on Emerging Trends of E-Commerce and the Green Future of India

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Manuscript ID:
BN-2025-020913

ISSN: 3065-7865

Volume 2

Issue 9

Sept 2025

Pp.62-65

Submitted: 07 Aug 2025

Revised: 17 Aug 2025

Accepted: 12 sept 2025

Published: 30 Sept 2025

DOI:
[10.5281/zenodo.17197614](https://doi.org/10.5281/zenodo.17197614)
DOI link:
<https://doi.org/10.5281/zenodo.17197614>



Quick Response Code:



Website: <https://bnir.us>



Abstract

India is going through a revolution in e-commerce. Markets and supply chains are changing as a result of the explosive growth of online retail, which is facilitated by digital public infrastructure such as UPI and ONDC. Environmental issues like packaging waste, carbon emissions from logistics, and increased energy demand from data infrastructure are associated with this growth, though. This essay examines the research on Indian e-commerce trends and how they relate to sustainability objectives. We simplify these insights, relate them to the Sustainable Development Goals (SDG 9, SDG 12, and SDG 13), and suggest a path forward for India's e-commerce industry to adopt more environmentally friendly practices. Opportunities in circular business models, open digital networks, sustainable packaging, and electric mobility are highlighted in the paper. We contend that the success of e-commerce will determine India's green future.

Keywords: Emerging trends of e commerce, Green Future of India, Sustainability

Introduction

E-commerce in India has grown rapidly over the last decade. With the spread of affordable internet, smartphones, and digital payments, millions of Indians are shopping online. This growth is supported by government-led initiatives like Aadhaar (digital identity), UPI (real-time payments), and ONDC (open commerce network). Reports suggest that India's e-commerce market will continue to expand beyond metro cities into small towns and villages.

However, this growth raises concerns. Online shopping often means more delivery vehicles, more packaging waste, and more energy use in warehouses and data centres. The environmental impact of e-commerce must be addressed if India wants to meet its sustainable development goals (SDGs). In particular, SDG 12 (Responsible Consumption and Production), SDG 9 (Innovation and Infrastructure), and SDG 13 (Climate Action) are directly relevant.

Objectives:

1. To identify the emerging trends of e-commerce to meet growing demand in India.
2. To identify challenges faced by e-commerce in order to attain SDGs.
3. To explore innovative solutions for sustainable and effective e-commerce operations.
4. To suggest the ways of using e-commerce for Indian green future.

Literature Review: - According to a report by 2026 the Indian e-commerce market may be valued at \$200 billion, because most of the people in India are using smartphones and the use of internet and e-commerce has grown significantly. Consumers must be educated about their shopping habits while taking sustainability and the environment into consideration (Shaina Arora 2019). Growing green consumerism must be the main goal. It's challenging to completely switch to environment-friendly or organic goods and services despite the fact that demand and supply are growing. According to a study online shopping may have a negative environmental impact compared to traditional retail establishments. Reduced packaging and eco-friendly shipping are two ways to save costs and satisfy customers.

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How to cite this article:

Mehta, R. R., & Chauhan, P. M. (2025). A Review Paper on Emerging Trends of E Commerce and the Green Future of India. Bulletin of Nexus, 2(9), 62–65. <https://doi.org/10.5281/zenodo.17197614>

However, we must also consider the drawbacks such as the possibility of fixed cost increases for small businesses and the possibility that they may not be cost-effective for certain customers. E-commerce advent has fundamentally altered how companies operate incorporating sustainable development (He P. Wang (2022)). Numerous aspects of the economy and society have been significantly impacted by the growth of e-commerce according to the sources. E-commerce is currently regarded as a significant development point in practically every economy (Aburaya 2020). The research demonstrates that e-commerce covers a much wider range of changes in how businesses conduct their operations and interact with stakeholders rather than merely being the buying and selling of goods and services online. It is widely accepted that e-commerce has increased transaction efficiency, produced jobs, and made economics viable. Furthermore, certain industries have benefited from e-commerce such as the promotion of price discovery and market transparency in the distribution of agricultural goods. Additionally, e-commerce has become the primary means of putting the new economy into practice and has played a big part in the digital market. But it's crucial to remember that e-commerce levels differ by nation especially in developing countries (Zhang2023). According to recent research India emits 285 grams of carbon dioxide (gCO₂) per delivery which is significantly more than the global weighted average of 204 gCO₂. The study actually discovered that five Indian cities—Delhi Mumbai Kolkata Bangalore and Chennai—emit more carbon dioxide from last-mile deliveries than the country as a whole. People are now more conscious of the environmental impact of their decisions. With estimates of 87 percent household internet penetration by 2025 the e-commerce industry in India is expanding significantly due to rising internet access and smartphone adoption. There will be more than 11.8 billion smartphone users by 2026 and voice shopping and regional language support will drive the growth of mobile commerce (iijpr2024). Social commerce is growing quickly especially in the beauty and fashion industries and the number of people using social media is rising dramatically. While rural and Tier-2/3 markets offer unrealized potential the combination of AI and technology improves customer engagement. In response to environmental concerns D2C models—which emphasize on being sustainable and following eco-friendly practices—are becoming more popular. For India to have a green future cooperation between stakeholders and government programs is crucial.

Challenges In the Way of E Commerce to Attain Sustainable Development Goals (Sdg)

Thinking more about the environment is the priority of manufacturers and sellers who are trying to sell things that are good for the planet. Online shopping has also joined hands in offering eco-friendly options. This is not just good for nature but can also make businesses more money. Many sellers online now have products that are better for the environment, and websites are giving rewards to customers who choose these options. Gen Z and Millennials, really care about supporting brands that care about the planet. While online shopping, they look for things that are not harmful for the environment. Special sections with catalogues are made on websites of Online shopping for showing full range of green products. They sell eco-friendly products along with delivering them in a way that's eco-friendly, using recyclable materials. Some new Indian online markets are also joining to sell eco-friendly product categories, from toys, personal care items, electronics and many more.

Despite its potential benefits, there are certain challenges like consumer demand analysis, issues of security, and the risk of cybercrime while using ecommerce. Other challenges include maintaining warehouses, delay in delivery, inaccessibility at rural areas because of network issues like villages and rural areas. This makes it hard for e-commerce to grow in these areas.

Green Initiatives examples by a few of major Indian e-commerce platforms

By 2025, Amazon plans to run its operations entirely on renewable energy, making it the largest corporate buyer of renewable energy globally.

By 2030, Google is assisting more than 500 local governments and cities worldwide in lowering a total of one gigabyte of carbon emissions per year.

For instance, in order to reach net-zero emissions by 2040, Flipkart intends to convert all of its last-mile fleet to electric vehicles by 2030. Additionally, it has been making an effort to use sustainable and less packaging. The business declared in 2021 that it had removed single-use plastic packaging from its supply chain. Micro-fulfilment centres are becoming increasingly important to Dunzo, a door-to door delivery service for groceries and other necessities. These tiny, frequently automated storage facilities are located near final consumers. By decreasing the need for long-distance transportation and lowering expenses, their growing use can lower carbon emissions. As a partner to these Indian companies, DHL Supply Chain India sustainably supports their growth in e-commerce. By the end of 2025, DHL

Supply Chain India plans to convert all of its intra-city fleet to electric or green fuel vehicles.

Suggestions and Conclusion:

Collaboration is necessary to improve the environmental impact of internet shopping. The government may assist by establishing new regulations, funding more efficient transportation, and guaranteeing that everyone has access to the internet. Businesses that sell goods online can employ more intelligent strategies, such as reducing the amount of packaging they use and collaborating with delivery services to reduce pollution. People should be more aware of how their decisions impact the environment, and online retailers may make it enjoyable by rewarding and discounting customers who choose more environmentally friendly options. Even though there are certain obstacles, such as power outages and a lack of awareness about online shopping, these concerns must be resolved if we want online shopping to improve. During COVID-19, delivering was a major challenge for the online shopping platforms in India, in order to control pollution. Use of clean energy, reducing waste, and use of electric vehicles (EVs) are important to lower pollution. Using drones and electric vehicles for delivery, switching to eco-friendly packaging and reducing our carbon footprints are important steps to make e-shopping greener, especially in India. The 6R Model can make e-commerce sustainable:

1. **Rethink** – Encourage eco-friendly consumer choices.
2. **Reduce** – Use less packaging and fewer trips.
3. **Replace** – Switch to greener materials.
4. **Reuse** – Promote reusable packaging and delivery containers.
5. **Recycle** – Collect and recycle packaging waste responsibly.
6. **Repair** – Support repair and refurbishing instead of replacement.

The e-commerce platforms are nowadays trying their hands on sustainable business models, like Eco-friendly manufacturing things with the help of materials and methods friendly for the environment. Less wastage due to increased durability of goods. Organic products without harmful chemicals keep people safe. Online shops are also trying to use materials from local sources to reduce pollution from transportation. Use of environment friendly packaging is also a priority for online businesses. Using the 6R model in packaging and labelling, reduction in pollution by less wastage is promoted. Prompt delivery is important for online shopping, for which methods with fewer emissions must be chosen.

A few suggestions are as follows

1. For Policymakers

- Provide financial support to small businesses.
- Support Electric Vehicle (EV) adoption with better charging infrastructure.
- Encourage carbon labelling for deliveries.

2. For Companies and Platforms

- Introduce “green checkout” options to nudge consumers.
- Shift fleets to electric and publish sustainability data.
- Adopt circular packaging systems.

3. For Consumers

- Choose eco-slots or slower deliveries when possible.
- Avoid unnecessary returns.
- Support sellers using green packaging.

Research Gaps

- Limited India-specific studies on the environmental concerns of e-commerce packaging.
- Lack of clear evidence on whether ONDC will reduce carbon emissions.
- Few studies on consumer response to so called green defaults in India.
- Need for more research on data centres and their energy use in India.

Conclusion

India's e-commerce revolution offers both opportunities and risks. It can make markets more inclusive and efficient, but it also brings environmental costs. By adopting sustainable logistics, responsible packaging, and open digital networks, India can align its e-commerce growth with SDGs 9, 12, and 13. The future of e-commerce in India will depend not only on how fast it grows, but also on how green it becomes. There are 3 important things to make e-commerce more sustainable are: first, being good for the environment by making products and processes that don't hurt nature; second, making sure everyone is financially stable by making a global market that works well and using resources wisely; and third, treating people fairly by meeting their needs and encouraging cultural growth. In the world of online businesses, there are opportunities like saving money with new technology and reaching more customers, but some businesses being small and not knowing the benefits of e-commerce to how to use it effectively, find it difficult to reposition themselves. Making a balance between these three aspects – the environment, the economy, and people – is important for ensuring a sustainable and profitable future for e-commerce. There are chances to save money with new technology and reach more clients in the world of

online enterprises. However, some firms are small and don't know how to use e-commerce successfully, so they have trouble repositioning themselves. Having a balance between these three aspects – the environment, the economy, and people – is important for ensuring a sustainable and profitable future for e-commerce. Other significant changes to make the whole process better for the environment, companies are doing things like, teaming up with other environmental friendly industries, using electric vehicles for deliveries, managing waste better, using renewable energy, and supporting sellers to learn about sustainability.

Acknowledgement

The authors would like to express their sincere gratitude to their respective institutions, VMV Commerce, JMT Arts and JJP Science College, Wardhman Nagar, Nagpur, for providing the necessary support and academic environment that enabled this research work. We are also thankful to the researchers and authors of the studies and reports referred to in this paper, whose valuable contributions have been instrumental in shaping the review. Finally, we extend our appreciation to colleagues, peers, and well-wishers for their constructive suggestions and encouragement throughout the development of this work.

Financial support:

Nil

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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