

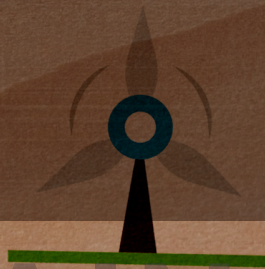


FOOD PROCESSING

Towards Sustainable Growth Opportunities



**SUSTAINABLE PACKAGING:
A STEP TOWARDS A GREENER FUTURE**



SUSTAINABLE PACKAGING:

A STEP TOWARDS A GREENER FUTURE



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ABSTRACT

This focus paper provides an overview of the current state of sustainable packaging in India and explores the potential for future growth and innovation in this sector. The paper highlights the increasing demand for sustainable packaging among Indian consumers, driven by concerns over plastic waste management, benefits of sustainable packaging and improving environmental sustainability. Among the industries, the food and beverage industry is identified as the largest user of sustainable packaging, followed by personal care and cosmetics.

In terms of packaging, the food packaging industry is one growth area that has seen the maximum number of innovations in terms of packaging and branding. The eco-friendly food packaging market is segmented on material selection, application, type and technique. Based on materials, the market is segmented into paper & paperboard, bioplastic, metal, glass and other packaging materials. Based on application the market is segmented into bakery, confectionery, meat, fish poultry, fruits and vegetables, dairy, beverages and convenience foods.

Based on the technique used the market is segmented into active packaging, moulded packaging and multipurpose packaging. Several major companies, including ITC, Dabur, DS groups, Nestle, PepsiCo, and HUL have made commitments to adopt sustainable packaging practices, including biodegradable materials, recyclable paper-based packaging, and compostable plastics. However, there is a need for more investment in sustainable packaging solutions, as India generates a significant amount of plastic waste with negative environmental impacts.

The government played a critical role in promoting sustainable packaging practices by implementing regulations for businesses to adopt environmentally friendly packaging practices. There are various types of sustainable packaging used in India, including their market analysis, future projections, pros and cons of sustainable packaging for both the environment and food, new technologies and innovations, and global market and consumption. The key concept of sustainable packaging revolves around a circular economy. The concept that increases the longevity of resources, minimizes waste and regenerates natural ecosystems.

Hence this focus paper provides insights into the current state and prospects of sustainable packaging in India, highlighting the need for increased investment and collaboration among the government, new business opportunities, and consumers to create a more sustainable future.

01. SUSTAINABLE PACKAGING

BRIEF DESCRIPTION

Sustainable packaging refers to packaging that is consciously designed to minimize its environmental impact, demonstrating a commitment to environmental stewardship. In the realm of sustainable packaging research, the ideal scenario is one where packaging materials are responsibly sourced, designed to be both effective and safe throughout their entire life cycle, conform to market standards for cost and performance, are produced using 100% renewable energy sources, and can be efficiently recycled into a valuable resource for future generations¹.

It is an approach to packaging that is designed to have minimal impact on the environment throughout its entire lifecycle. **This includes the use of materials that are biodegradable, recyclable, or compostable, and designs that are efficient, reusable, or refillable.** The goal is to reduce the amount of waste generated and limit the consumption of non-renewable resources, as well as minimize pollution and greenhouse gas emissions.

¹ Ziyet Boz 1,2,* , Virpi Korhonen³ and Claire Koelsch Sand², Consumer Considerations for the Implementation of Sustainable Packaging: A Review,

Sustainable packaging refers to the design and use of packaging materials that have minimal impact on the environment throughout their lifecycle. This includes using materials that are eco-friendly and renewable, reducing waste, and minimizing the carbon footprint associated with the production, transportation, and disposal of packaging materials. The goal of sustainable packaging is to protect the product while also reducing the environmental impact of the packaging itself.

Packaging can be sustainable in numerous ways, such as featuring total recycled materials, creating reusable packaging to maximize the packing material's longevity, and choosing production processes with the least environmental impact. The use of sustainable packaging has several benefits, such as reducing the amount of waste generated, lowering the carbon footprint of products, and improving the reputation of businesses that adopt sustainable practices. However, there are also some challenges and limitations to sustainable packaging, such as the higher cost of materials and production, the need for more efficient recycling and waste management systems, and the potential impact on the quality and safety of the packaged products.

In recent years, sustainable packaging has gained global attention as an effective way to mitigate the environmental impact of product packaging throughout its lifecycle. India, a country with a rapidly growing population and increasing consumer awareness about environmental issues, is no exception to this trend. The present study aims to investigate the various types of sustainable packaging used in India, including comprehensive market analysis, future projections, and the associated pros and cons for both the environment and the food industry. Additionally, the study will explore the latest technological innovations in sustainable packaging and examine India's position in the global market with respect to sustainable packaging, including the country's areas of lagging performance. The presented criteria in this context integrate comprehensive sustainability and industrial ecology objectives with business considerations and strategies that specifically target the environmental challenges linked to the life cycle of packaging².

² <https://sustainablepackaging.org/wp-content/uploads/2017/09/Definition-of-Sustainable-Packaging.pdf>



02.

TYPES OF SUSTAINABLE PACKAGING

In India, sustainable packaging materials commonly utilized for food packaging include biodegradable plastics, compostable plastics, and paper-based materials. Biodegradable plastics, which are composed of natural materials, can readily decompose in the environment without leaving any detrimental residues.

Compostable plastics, made from natural materials like starch or cellulose, can disintegrate in a composting environment. Paper-based materials, produced from renewable and sustainable resources, are capable of being recycled, reused, or composted³.

³ <https://www.highspeedtraining.co.uk/hub/types-of-sustainable-food-packaging/>



2.1 BIODEGRADABLE PLASTICS:

A diverse range of materials, including corn starch and sugarcane, can be utilized to produce biodegradable plastics. These materials undergo processing to create a biopolymer, which is subsequently employed in the production of a wide assortment of items such as bags, containers, and cutlery. Biodegradable plastics are frequently promoted as a sustainable alternative to conventional plastics since they undergo degradation into natural materials when exposed to specific environmental conditions.



2.2 COMPOSTABLE PLASTICS:

Compostable plastics share similarities with biodegradable plastics as they both originate from renewable resources, such as cellulose or corn starch. Nevertheless, compostable plastics are engineered to degrade into organic compounds under precise environmental conditions, mainly in commercial composting facilities. Compostable plastics' feedstocks are frequently obtained from renewable agricultural resources, rendering them an eco-friendlier substitute to conventional plastics.



2.3 PAPER-BASED MATERIALS:

Paper-based materials, including paperboard, corrugated cardboard, and moulded pulp, are composed of wood fibres extracted from trees, and are renewable, recyclable, and biodegradable. The production of paper-based materials involves the sequential stages of tree harvesting, wood fibre processing, and paper manufacturing. Though paper-based materials are considered a sustainable option, it is imperative to guarantee that the wood fibres utilized are procured from sustainably managed forests.



2.4 PLANT-BASED MATERIALS:

Plant-based materials, including bamboo, bagasse, and wheat straw, are produced from sustainable agricultural sources, and are commonly employed in disposable products like utensils, cups, and plates. The process of producing plant-based materials entails obtaining the raw material, processing it into a practical form, and manufacturing the ultimate product. These materials represent a sustainable alternative since they originate from renewable resources and can be composted when they have reached the end of their lifespan.



2.5 METAL AND GLASS:

Metal and glass are deemed sustainable options for packaging owing to their exceptional durability and recyclability, which allows for infinite reuse. The production of glass requires sand, soda ash, limestone, and other natural minerals, while the manufacture of metal packaging necessitates iron, aluminium, and other metals. Despite their sustainability credentials, these materials are rarely used for food packaging because of their weight and susceptibility to damage.





2.6 MULTILAYER PACKAGING:

Multilayer packaging refers to a packaging material comprising three layers: the barrier layer, the active layer, and the control layer. The barrier layer serves as a protective shield against substances that can degrade packaged food. The active layer contains ingredients like antioxidants and antimicrobials, which are released into the food at a controlled rate. The control layer regulates the release of active ingredients and safeguards the food. By adjusting material properties and structure, the release of active ingredients can be managed to prolong their effectiveness. Various techniques, including Layer-by-Layer (LbL) Assembly, Electrospinning, Coating, and Solvent-Casting, have been utilized to create multilayer films with desired release profiles for different active ingredients.

These above-mentioned practices are mainly followed up by the organized sector, but in India, there is a buzzing unorganized sector participating as well with the usage of bio-degradable packaging practices such as usage of tree-based plates, cutlery. Moreover, the traditional practice of using banana leaves in different regions of India is widely practiced by food vendors and is not only environmentally friendly but provides health benefits as well⁴.



MULTILAYER SANDWICH-STRUCTURE
EDIBLE PACKAGING

ACTIVE INGREDIENT

⁴Gopi Karelia, Science on Why Banana Leaves Have Been a Part of Indian Food For Centuries

03.

ADVANTAGES, CHALLENGES, AND REWARDS OF UTILIZING ENVIRONMENTALLY SOUND PACKAGING SOLUTIONS

Sustainable packaging confers numerous environmental advantages, such as mitigating waste production and minimizing the utilization of non-renewable resources. Moreover, sustainable packaging can aid in the reduction of greenhouse gas emissions, a contributing factor to climate change. Nonetheless, sustainable packaging may also present potential drawbacks. For instance, certain sustainable packaging materials may necessitate a greater amount of energy for production compared to traditional materials, resulting in heightened carbon emissions. Moreover, some sustainable packaging materials may not be compatible with all food products, impeding their applicability within the food industry.

BENEFITS TO BUSINESSES:



3.1 INCREASED CUSTOMER LOYALTY:

In the past five years, there has been an astounding 71% surge in the popularity of searches for sustainable goods, as revealed by a recent global research study conducted by the Economist Intelligence Unit (EIU) on behalf of WWF⁵. This trend reflects customers' growing preoccupation with the ecological impact of their purchases and their inclination to patronize businesses that align with their values. Thus, by promoting and highlighting sustainability initiatives, companies can enhance customer retention and attract new patrons.



3.2 REDUCED GOVERNMENT REGULATIONS:

In response to packaging waste concerns, governments are implementing strict regulations on packaging materials that fail to meet environmental standards. For instance, India's Bureau of Indian Standards (BIS) has introduced temporary biodegradable plastic testing procedures that require a minimum biodegradation rate of 90% to pass, a process that can take up to two years⁶. By adopting sustainable packaging practices, businesses can mitigate the risks associated with government regulations on packaging and supply chain operations. Additionally, the government's promotional policies, led by organizations like FSSAI under the Ministry of Health and Family Welfare, aim to address concerns about safe and sustainable packaging. These policies promote innovative and alternative food packaging materials while focusing on risk assessment and material safety. The prohibition of single-use plastic has opened opportunities for increased paper product usage, the development of new paper products, and the creation of job opportunities. However, challenges arise in implementing standards that address diverse packaging demands, including varying criteria for different regions of the country, which may require the involvement of the Bureau of Indian Standards.



3.3 A CHANGING INDUSTRY:

Since plastic has inherent characteristics such as good barrier properties, lightweight quality, and low cost, it is able to outcast sustainable packaging, but recently with rising health concerns and non-cost effectiveness of plastic reusability, the packaging industry has seen a shift in preferences from plastic to biodegradable goods⁷. As a result, more companies have entered the sustainable packaging market.

⁵ <https://www.worldwildlife.org/>

⁶ <https://www.india-briefing.com/>

⁷ Idowu David Ibrahim¹, Yskandar Hamam^{2,3}, Emmanuel Rotimi Sadiku¹, Julius Musyoka Ndambuki⁴, Williams Kehinde Kupolati⁴, Tamba Jamiru⁵, Azunna Agwo Eze¹ and Jacques Snyman⁴, Need for Sustainable Packaging: An Overview



3.4 MAXIMIZING COST-EFFICIENCY

Green packaging presents significant potential for long-term cost savings, albeit with the rewarding challenge of determining the precise point where these savings surpass the initial investment. Adaptable and strategic planning is key, as the timeframe for reaping financial benefits may vary, ultimately maximizing effectiveness.



3.5 SUSTAINABLE SOURCING

By utilizing eco-friendly packaging materials like corn-starch-based PLA, we contribute to sustainable practices through the cultivation of crops like corn. However, it is important to consider valid concerns raised by critics regarding the optimal utilization of these crops in addressing pressing issues such as poverty and hunger. Moreover, the use of bamboo-based packaging is extremely good for the environment as it provides benefits such as renewability, with it being 100% biodegradable and compostable in 2-6 months.



3.6 ENSURING EFFECTIVE DISPOSAL

Proper disposal practices play a crucial role in facilitating the efficient breakdown and recycling of eco-friendly packaging. To minimize the risk of cross-contamination, it is essential to ensure appropriate segregation of these products before reaching recycling facilities. By doing so, we can preserve the recyclability of other materials and prevent unintended waste.



3.7 UNLOCKING SOLUTIONS THROUGH RESEARCH AND DEVELOPMENT

It is crucial to highlight the immense potential of eco-friendly packaging. Ongoing research and development, along with enhanced recycling infrastructure and sustainable sourcing practices, offer promising solutions to overcome any challenges associated with eco-friendly packaging. There are three crucial aspects pertaining to sustainable packaging: enhancing cost-effectiveness, ensuring convenient storage without compromising food quality, and exploring strategies to boost the utilization of Indic products in the manufacturing process.

BENEFITS TO ENVIRONMENT



Sustainable packaging aims to decrease the use of non-biodegradable or biologically damaging materials and substitute them with alternatives that are easily decomposable or reusable. Furthermore, it avoids the occurrence of allergic reactions caused by harmful substances leaching into the packed items.



The materials employed in the production of environmentally friendly packaging are either recycled or reused, or they can serve as a source of soil nutrients when composted.



Eco-friendly packaging solutions present a sustainable approach to packaging that addresses the demands of consumers for convenience and comfort while also safeguarding the environment. They decrease the possibility of toxic consequences, ensuring that the product is safe and healthy for consumers. Furthermore, eco-friendly packaging materials have a more sustainable production process, requiring less energy and water compared to traditional methods.



04.

HARNESSING FOOD WASTE FOR SUSTAINABLE BIOPOLYMERS: OPPORTUNITIES, CHALLENGES, AND SURFACE MODIFICATION ADVANCEMENTS

The growing global population has resulted in an increased demand for food processing, leading to a rise in food processing waste. According to a report by the Food and Agriculture Organization (FAO), approximately 1.3 billion tons of food are wasted annually. This waste originates from various sources, including food industries and post-harvest agro-processing, posing a significant environmental threat⁸. Instead of disposing of these food wastes in landfills or using them for compost, there is a growing interest in recycling them into value-added products, particularly biopolymers. Biopolymers are attracting attention due to their biodegradability, biocompatibility, and bio-based nature.

They can be derived from food wastes through extraction or fermentation processes. Biopolymers obtained from food waste possess diverse properties that make them suitable for various applications, including medicine, food industries, biosensors, industrial plastics, clothing fabrics, water treatment chemicals, cosmetics, and pharmaceuticals. However, despite their potential, biopolymers face challenges concerning their mechanical, thermal, and barrier properties, which limit their widespread industrial application. Two prominent biopolymers in the market for biodegradable plastics are polylactic acid (PLA) and polyhydroxyalkanoates (PHA).

⁸ L. Xue, G. Liu, J. Parfitt, X. Liu, E. Van Herpen, Å. Stenmarck, C. O'Connor, K. Östergren, S. Cheng, A critical review of global food losses and food waste data,

The demand for PLA is projected to double by 2023, while PHA production from commercial manufacturers reached 2.05 million tons in 2017. The global market size of PHA is expected to grow from USD 57 million in 2019 to USD 98 million by 2024. Biopolymers derived from food waste can serve as renewable, eco-friendly, and bio-based alternatives to petroleum-based plastics⁹.

Food waste generated by various industries can serve as valuable sources for biopolymers. Examples include abattoir waste (bones, tendons, skin), waste from grain processing industries (broken grains, husk), waste from dairy processing industries (whey, cheese residue), waste from fruit and vegetable processing (peel, pomace), and waste from beverage production (molasses, spent grains). These waste streams contain valuable biopolymers such as collagen, gelatine, chitin/chitosan, cellulose, hemicellulose, lignin, and xanthan gum, which can be extracted and utilized. Surface modification of biopolymers offers several advantages for improving their properties and performance.

Here are key points highlighting how surface modification can enhance biopolymers:

4.1 ENHANCED BIOCOMPATIBILITY:

Surface modifications can enhance the biocompatibility of biopolymers, reducing inflammation and promoting tissue regeneration. This is crucial for applications in tissue engineering and biomedical devices.

4.2 TAILORED SURFACE APROPERTIES:

Surface modifications enable the customization of surface properties, such as hydrophobicity/hydrophilicity, roughness, and charge. These modifications can influence cell adhesion, protein adsorption, and cellular response, leading to improved interactions with the biological environment.



⁹ Yiu Fai Tsang, Vanish Kumar, Pallabi Samadar, Yi Yang, Jechan Lee, Yong Sik Ok, Hocheol Song, Ki-Hyun Kim, Eilhann E. Kwon, Young Jae Jeon, Production of bioplastic through food waste valorization

05.

MARKET OVERVIEW

The global market for sustainable packaging had a market size of USD 274.15 billion in 2020 and is projected to achieve a compound annual growth rate (CAGR) of 6.5 % between 2023 to 2030¹⁰. The surge in growth can be attributed to the rising consumer awareness of sustainable packaging and the implementation of strict regulations against the use of single-use plastics. The industry is expected to maintain a consistent growth trajectory as the food and beverage sector increasingly adopts packaging solutions crafted from biodegradable and recyclable materials.

The food service sector is replacing single-use plastic items such as straws, lids, caps, cups, and food trays with paper or compostable alternatives, resulting in increased demand for green packaging in this industry. The trend is expected to continue as consumers prefer convenience and packaged foods.

The COVID-19 pandemic has impacted the food and beverage industry as well, which has exhibited substantial growth and is anticipated to sustain its growth trajectory over the forecast period, thereby benefiting the sustainable packaging industry. The food and beverage industry is addressing consumer preferences by providing on-the-go consumption products, which are likely to result in increased demand for packaging in food and beverage applications.

¹⁰ <https://www.grandviewresearch.com/industry-analysis/green-packaging-market>

Sustainable packaging encompasses a range of practices, from selecting environment-friendly materials to optimizing the package size. Although the adoption of sustainable packaging may lead to an initial cost increase in certain scenarios, long-term benefits, and cost savings are of paramount importance. In India, the market for sustainable packaging has grown significantly, owing to rising environmental concerns and customer desire for eco-friendly alternatives. Uflex Ltd., Huhtamaki PPL Ltd., Tetra Pak India, Parksons Packaging Ltd., and Ecoware Solutions Pvt. Ltd. are among the key players. The Plastic Waste Management Rules, the Extended Producer Responsibility (EPR) framework, and the Swachh Bharat Abhiyan (Clean India Mission) are among the significant programmes and policies. These rules seek to encourage the use of environmentally friendly packaging, to promote recycling and waste management, and to hold manufacturers accountable for their packaging waste. Furthermore, the Ministry of Food Processing Industries (MoFPI) has implemented several programmes, including the Pradhan Mantri Kisan SAMPADA Yojana (PMKSY), the Scheme for Cold Chain, Value Addition, and Preservation Infrastructure (CVPIIS), and Capacity Building, among others. These offer financial assistance, grants, and subsidies to encourage the adoption of eco-friendly packaging solutions.

06.

CUTTING-EDGE TECHNOLOGY AND INNOVATION

India is witnessing the emergence of new sustainable packaging technologies and innovations. Notably, companies are actively engaged in the development of new types of biodegradable plastics that have enhanced biodegradability in the environment. Additionally, ongoing research is dedicated to creating new technologies that enable more efficient and effective recycling and composting practices.

6.1 BOTTLES MADE FROM RECYCLED FISHING NETS:

Recycling discarded fishing nets into bottles is an innovative strategy to address ocean plastic pollution. Companies collect and convert the nets into pellets, which are used to produce bottles, thereby reducing waste and conserving resources.

This approach not only offers a solution to an environmental problem but also creates a new market for discarded fishing nets. Overall, this innovation promotes sustainability in packaging and contributes to addressing environmental challenges¹¹.

6.2 TAILORED SURFACE APROPERTIES:

Seaweed-based packaging offers an environmentally friendly option in contrast to conventional plastic packaging. Derived from a sustainable resource, seaweed-based packaging is biodegradable and compostable, making it an attractive solution for various industries, particularly in food and beverage packaging. The utilization of seaweed-based packaging decreases plastic waste, thereby promoting packaging sustainability.

¹¹ <https://www.weavabel.com/blog/innovations-in-packaging-materials-were-excited-about>

6.3 WATER-SOLUBLE PACKAGING:

Water-soluble packaging is a promising alternative to conventional packaging materials. This eco-friendly innovation dissolves in water without leaving any toxic residues, making it ideal for various applications, particularly in reducing the need for single-use plastic packaging. By minimizing waste and pollution, water-soluble packaging promotes sustainability in the packaging industry

6.4 3D-PRINTED PACKAGING:

3D-printed packaging is a novel approach that enables customization of packaging based on demand, reducing waste and improving efficiency. It is produced using sustainable materials, and precise measurements result in less material waste. Moreover, the packaging can be designed with specific functions to enhance the customer experience. The adoption of this innovation promotes sustainability in packaging while also improving the overall efficiency of the packaging process.

6.5 PACKAGING MADE FROM COW MANURE:

Packaging derived from cow manure is a distinctive innovation that transforms an abundant waste product into a sustainable packaging material. Its potential to minimize waste, encourage sustainable agricultural practices, and promote the circular economy is noteworthy. This innovation provides an environmentally friendly and compostable substitute to conventional materials and has the potential to revolutionize the packaging industry.

6.6 PACKAGING MADE FROM AGRO-PROCESSING INDUSTRY WASTE:

Agriculture waste includes field residues such as stems, stalks, leaves, seedpods, and process residues like husks, seeds, roots, bagasse, and molasses. Waste from food processing units consists of organic residues such as fruit seeds, citrus peels, potato peels, coconut shells, wheat straw, rice husks, pomace, etc. Due to the varied composition of cellulose, hemicelluloses, proteins, and lipids, these wastes serve as a raw material to produce biodegradable and sustainable packaging material.

07.

INTERNATIONAL MARKET TRENDS AND CONSUMPTION PATTERNS



In the global market, Europe has been the largest consumer of sustainable packaging, followed by North America. Nonetheless, the Asia-Pacific region is projected to have the highest growth rate, with India and China spearheading this expansion. Sustainable packaging's biggest end-user is the food and beverage sector, with the personal care and cosmetics industry coming in second.



7.1

Sustainable packaging is a design approach that focuses on reducing the environmental impact of packaging through the use of life cycle assessments and inventories to guide packaging decisions¹².

7.2

The demand for sustainable packaging has been growing due to the increasing awareness of environmental issues and the need for sustainable solutions. Consumers are showing more interest in eco-friendly packaging options, and companies are adopting sustainable packaging practices to meet the growing demand. This trend is driving the market for sustainable packaging.

7.3

The Asia-Pacific region is anticipated to experience the most rapid expansion in the market for sustainable packaging. This growth can be attributed to the region's rising awareness of environmental concerns, the growing demand from consumers for eco-friendly products, and the government's efforts to promote sustainable packaging practices.

7.4

In general, the sustainable packaging market is anticipated to expand globally as more businesses adopt sustainable packaging practices in response to consumer demand and to minimize their environmental impact.

¹² <https://www.mordorintelligence.com/industry-reports/sustainable-packaging-market>

08.

PRESENT-DAY ENDEAVOURS INDIA PLASTICS PACT



In an effort to adopt a circular economy approach, corporations, governments, and NGOs have collaborated under the India Plastics Pact to reduce, reuse, and recycle plastics throughout the entire value chain¹³. The India Plastics Pact was launched in September 2021, an initiative developed by the Confederation of Indian Industry (CII) and WWF India. The primary goal of the Pact is to transform the linear plastics industry into a circular one, thereby:

¹³ <https://www.indioplasticspact.org/>

 **8.1**

Mitigate India's dependence on environmentally harmful plastics.

 **8.2**

Retain critical resources within the economy to enable their utilization in the production of further commodities

 **8.3**

Foster opportunities for investment, job creation, and expansion within India's plastics sector.

 **8.4**

By 2030, the objectives outlined by the India Plastics Pact are required to be accomplished¹⁴.

8.4.1 Conducting an inventory of plastic goods and packaging items that are redundant or problematic, and initiating measures to restructure and create novel resolutions for each of the identified challenges.

8.4.2 Achieving full reusability or recyclability of all plastic packaging materials.

8.4.3 Attaining a recycling rate of 50% for plastic packaging.

8.4.4 Reaching an average of 25% recycled content across all plastic packaging products.

Various government bodies involved in this are the Ministry of Environment, Forest and Climate Change (MoEFCC), Central Pollution Control Board (CPCB), Ministry of Chemicals and Fertilizers, State Pollution Control Boards (SPCBs), NITI Aayog and lastly Ministry of Food Processing Industries (MoFPI).

¹⁴ <https://www.indiaplasticspact.org/roadmap/>

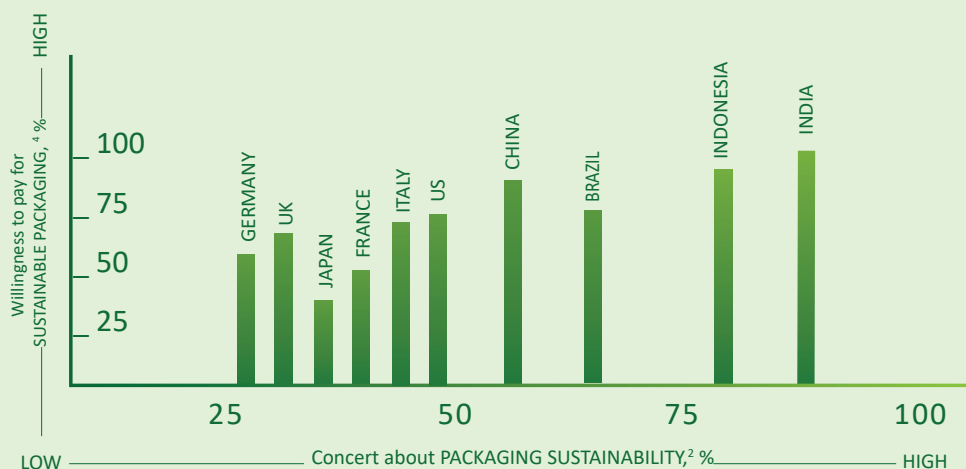
09.

ANTICIPATED TRENDS AND PROJECTIONS

In India, sustainable packaging is projected to become even more critical in the coming years. The demand for packaged food and beverages is expected to rise due to increased urbanization and income levels. This rise in demand for packaging products will necessitate the development of sustainable packaging solutions. As consumer preferences continue to evolve, the demand for eco-friendly products is also predicted to rise, which would result in an increased need for sustainable packaging.

According to a recent study, consumer behaviour and sustainability are rapidly evolving, a significant majority of consumers, accounting for 79%, have begun to modify their purchasing preferences based on factors such as social responsibility, inclusiveness, and environmental impact¹⁵. The research also discovered that a significant proportion of consumers, especially 53% of all consumers and 57% of the 18-24 age group, have begun to prefer lesser-known brands that exhibit sustainable practices. Moreover, more than half of the consumers, comprising 52%, indicate that they have developed an emotional connection with products or organizations that are perceived as sustainable. This trend not only highlights the growing importance of sustainable packaging but also demonstrates the impact of sustainability on consumer purchasing decisions¹⁶.

In a global context, the issue of packaging sustainability is of significant concern to the majority of consumers, who exhibit a high level of willingness to incur additional costs for the acquisition of sustainable packaging¹⁷



The percentage of survey participants from specific countries, as determined through the research study.

¹⁵ Research: How Sustainability Is Changing Consumer Preferences, Capgemini

¹⁶ <https://www.businessinsider.in>

¹⁷ <https://www.mckinsey.com/industries/paper-forest-products-and-packaging/our-insights/sustainability-in-packaging-global-regulatory-development-across-30-countries#/>

10.

SUSTAINABLE PACKAGING AS A DISRUPTIVE FORCE

In India, sustainable packaging materials commonly utilized for food packaging include biodegradable plastics, compostable plastics, and paper-based materials. Biodegradable plastics, which are composed of natural materials, can readily decompose in the environment without leaving any detrimental residues.



10.1

ITC LIMITED

ITC is a multinational conglomerate with diverse business interests spanning various industries, such as FMCG, paperboards, and packaging. The organization has initiated a series of eco-friendly packaging solutions for its food products, which include biodegradable paper-based packaging and recyclable paperboard packaging. As an alternative to single-use plastics and LDPE-coated cups, ITC has introduced FiloBev, a food-grade board that is 100% recyclable. The sustainable packaging material is derived from wood fibres procured from sustainable pulpwood plantations and is endowed with superior water-resistant properties due to a specialized barrier coating. It can be readily heat-sealed in existing machines and was developed with the primary purpose of providing eco-friendly beverage-serving options¹⁸.



10.2

NESTLE

Nestle is a prominent global food and beverage conglomerate with a significant presence in India. The organization has initiated multiple sustainable packaging initiatives, such as the introduction of recyclable paper-based packaging for its Maggi noodles and a partnership with waste management companies to establish a plastic waste collection and recycling program. Nestle has set ambitious sustainability goals, intending to create all plastic packaging for recycling and achieve a recyclable packaging rate of over 95% by 2025. Currently, Nestle has achieved a recyclability or reusability rate of 85.8% for its overall packaging, and 81.9% of its plastic packaging is specifically designed for recycling. As a prominent multinational company, Nestle recognizes its accountability and is committed to leveraging its size and influence to advocate for sustainable approaches. The organization eliminated 240 metric tons of PVC by removing plastic tear-offs from its water bottles in Egypt, while also removing 2300 metric tons of plastics by eliminating over-cap lids from its puree tubs in the US under the Gerber brand¹⁹.

¹⁸ <https://www.itcportal.com/itc-stories/filobev-sustainable-packaging-from-itc.aspx>

¹⁹ <https://www.nestle.com/ask-nestle/environment/answers/tackling-packaging-waste-plastic-bottles>



10.3

PEPSICO

PepsiCo is a prominent global food and beverage corporation with a considerable market presence in India, through brands like Pepsi, Lay's, and Tropicana. The organization has pledged to make all of its packaging either compostable, biodegradable, or recyclable by 2025 and is actively investing in sustainable packaging solutions. These initiatives include the introduction of compostable packaging for snacks and paper-based packaging for beverages. Moreover, PepsiCo is pursuing sustainability by exploring innovative materials such as the world's first fully recyclable paper bottle created by the Pulpex consortium. The company is also investing in reusable models like SodaStream, intending to avoid the use of 67 billion single-use plastic bottles worldwide by 2025 through the expansion of this product line²⁰



10.4

HINDUSTAN UNILEVER LIMITED (HUL)

Hindustan Unilever Limited (HUL) is one of the most significant FMCG companies in India, with a diverse range of well-known brands, including Surf Excel, Lux, and Dove. The organization has committed to achieving 100% recyclable, reusable, or compostable packaging by 2025 and is actively investing in sustainable packaging solutions. These initiatives involve the adoption of paper-based packaging and biodegradable plastics. HUL has also made a substantial investment of \$15 million in the Closed Loop Partners' Leadership Fund in the United States to advance recycling efforts²¹.

²⁰<https://www.pepsico.com/our-stories/press-release/pepsico-commits-to-100-recycled-plastic-beverage-bottles-for-its-pepsi-brand-in-9-e-u-markets-by-2022>

11.

CUTTING-EDGE TECHNOLOGY AND INNOVATION

There are two critical factors that hinder the growth and adoption of sustainable packaging materials in India. Firstly, the lack of proper infrastructure for recycling and composting of such materials impedes their use. Sustainable packaging materials like bioplastics or paper-based materials require specialized infrastructure for processing, disposal, and recycling. However, the country still lags in creating such infrastructure, thereby making it difficult for manufacturers and businesses to adopt these materials.

Secondly, the higher costs associated with sustainable packaging materials, in contrast to traditional packaging materials, present a significant financial deterrent for various stakeholders operating in this industry. The cost of manufacturing and processing sustainable packaging materials is often higher than that of traditional materials. This cost difference is primarily due to the higher production costs involved in obtaining raw materials and the specialized processing technology required to manufacture sustainable packaging. Consequently, the price of sustainable packaging materials remains high, making them less accessible to price-sensitive consumers.

These limiting factors present significant challenges to the widespread adoption of eco-friendly packaging materials in the country. As a result, policymakers, manufacturers, and industry stakeholders must work collaboratively to address these challenges and promote the adoption of sustainable packaging solutions.

¹⁹ <https://www.nestle.com/ask-nestle/environment/answers/tackling-packaging-waste-plastic-bottles>

12. CONCLUSION

In today's world, where environmental concerns are at the forefront, sustainable packaging has become a crucial approach to minimize the negative impact of packaging materials on the environment. By consciously designing packaging to be environmentally friendly throughout its entire lifecycle, sustainable packaging offers a range of advantages that contribute to a more sustainable future.

One of the primary benefits of sustainable packaging is waste reduction. By utilizing materials that are biodegradable, recyclable, or compostable, sustainable packaging helps reduce the amount of waste generated. This not only addresses the problem of overflowing landfills but also contributes to a circular economy by ensuring that packaging materials can be efficiently recycled or reused as valuable resources.

Another advantage of sustainable packaging is the decreased carbon footprint it offers. Sustainable packaging materials, such as biodegradable plastics, compostable plastics, and paper-based materials, require less energy and water during production compared to traditional packaging materials. This leads to lower greenhouse gas emissions and helps mitigate climate change, which is a pressing global issue.

Moreover, adopting sustainable packaging practices can enhance customer loyalty. Consumers today are increasingly aware of the environmental impact of their purchases and are inclined to support businesses that align with their values. By promoting and highlighting sustainability initiatives, companies can attract and retain customers who prioritize eco-friendly products. This not only strengthens the reputation and brand image of businesses but also drives market demand for sustainable packaging solutions.

Furthermore, sustainable packaging can lead to reduced government regulations. Governments worldwide are implementing strict regulations on packaging materials that fail to meet environmental standards. By proactively adopting sustainable packaging practices, businesses can mitigate the risks associated with regulatory compliance and ensure their packaging and supply chain operations align with environmental regulations. This not only reduces potential penalties but also demonstrates a commitment to environmental responsibility.

Based on the analysis of the current state of packaging in India, it becomes evident that embracing more sustainable packaging solutions is not just important, but crucial. India generates a substantial amount of plastic waste, leading to adverse environmental consequences such as water and land pollution, harm to wildlife, and greenhouse gas emissions.

Fortunately, India has already taken significant steps towards addressing this pressing issue by prioritizing investments in sustainable packaging solutions. Efforts such as the utilization of biodegradable materials, the establishment of robust recycling infrastructure, and the promotion of reusable containers have been made. However, there is still a need to create greater awareness and encourage widespread adoption of sustainable packaging practices.

India aims to reduce its total projected carbon emissions by one billion tonnes by 2030 as part of its commitment to preserving the climate. Additionally, the country strives to decrease the carbon intensity of its economy by 45% by 2030, based on 2005 levels. India also has the goal of achieving net zero emissions by 2070.

Although there are challenges associated with sustainable packaging, such as higher costs and the need for improved infrastructure, the benefits outweigh the drawbacks. While sustainable packaging materials may have higher upfront costs compared to traditional materials, they offer long-term cost savings and contribute to a more sustainable business model. Additionally, the challenges related to infrastructure, such as recycling and waste management systems, can be addressed through collaborative efforts between policymakers, manufacturers, and industry stakeholders. By working together, they can develop and implement effective solutions that support the widespread adoption of sustainable packaging materials.

In conclusion, India stands at an opportune moment to further advance sustainable packaging practices, leading to positive outcomes for the environment and creating a brighter future. By fostering collaboration among the government, businesses, and consumers, we can work together to achieve a substantial reduction in plastic waste and pave the way for a sustainable India.

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Published by

Economic Division

**Ministry of Food Processing Industries,
Government of India**

Panchsheel Bhawan, New Delhi – 110049



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