OPPORTUNITY ASSESSMENT

INDIAN SUSTAINABLE PACKAGING

Table of Contents

List of Tables

List of Figures

1. Executive Summary

Indian growth juggernaut continues despite the pandemic challenge over last two years of pandemic. Various studies from institutions like the World Bank, IMF predict India to be amongst the fastest growing economies in the world. A major driver of this growth is the domestic consumption led by the troika of demography, increased disposable income and higher exports.

However, the growth cannot be a "business as usual" approach due to inherent resource constraint especially related to certain raw material access, multiple competition on land use and environmental degradation. The clean India campaign has created heightened awareness of the need for waste disposal and the pandemic has been an accelerator for more healthy way of living.

Increasingly the consumer purchasing preference is based on social responsibility, inclusiveness, or environmental issue. During the pandemic several brands launched limited-edition eco-friendly packaging to test the acceptability of products in the market and some of the leading players have made public announcements to make sustainability part of their value chain.

This is in accordance with the Indian government's initiative to reduce plastic waste. According to the new rules on plastic usage, single-use plastic shall be banned nationwide from July 2022. This new policy and other regulatory interventions have become a driving force for companies operating in the sustainable packaging value chain to adopt new innovations and technologies.

India's per capita packaging consumption remains below global average and the supplier ecosystem is still dominated by small and medium enterprises (SMEs). Due to cost implications, these SMEs find it difficult to scale up potential sustainable solutions. Furthermore, the lack of advanced technology in sourcing sustainable raw materials is a major challenge. Available technologies make the end-product expensive in comparison to the existing non-sustainable alternatives.

The cost differential between non-sustainable packaging products and sustainable solutions in the Indian market has led to a polarisation of Indian consumers. While we see innovative solutions being adopted by companies producing premium products, companies with cost-friendly products lean towards using low-cost solutions which are not entirely environment friendly.

FMCG, e-commerce, food & beverages, food delivery sector and pharmaceuticals have been early adopters of sustainable packaging in the country. Start-up-driven ecosystem with access to capital from private investors including impact funds is leading the way for new technological innovations.

This report focuses on identifying the strengths of the Finnish innovative value chain and mapping it to the gaps in the Indian context. The report further delves into the segmental opportunity potential in sustainable packaging in India. This includes identifying the demand outlook, market competition, challenges, risks, and drivers of growth.

2. Finish Packaging Industry

2.1. Circular Economy in Finland

Finland has been a global pioneer of the circular economy. In 2016, the country drew up a road map for transitioning to a circular economy. This included 4 actionable goals—renewal of foundations of competitiveness and vitality, transferring to an economy based on low carbon energy treating natural resources as scarce, and bringing about a change in everyday decision-making. These goals are to be targeted by the key stakeholders. The Finnish circular economy identifies 4 groups as the key stakeholders: the central government, the municipalities and cities, enterprises, and citizens.

Finland is the **first country to create a circular economy roadmap.**

According to Forbes, **Helsinki, the capital of Finland, is one of the most sustainable cities in Europe.**

Finland ranks **#1 in bio-based circular economy, battery recycling, and wood-based fibre manufacturing**

In 2018, Finland further renewed its road map to drive the focus of the economy towards sustainability. Currently, the government aims to reach carbon neutrality and transform into a completely circular economy by 2035.In 2018, Finland further renewed its roadmap to drive the focus of the economy towards ensuring sustainability. Currently, the government aims to reach *carbon neutrality and transform its economy into a completely circular one by 2035.*

The impact of the endeavours can be seen in the five primary sectors in the country viz. packaging, textile and fibres, healthcare and cosmetics, interior designing, and agrotechnology.

2.2. Innovation in Finnish Sustainable Packaging

Finland is home to a comprehensive and innovative sustainable packaging ecosystem that is based on bio-based, wood-based, bioplastics, fibre-based, recycled waste, paper-based and plant-based materials.

Finland's portfolio offers solutions to numerous industries such as pharmaceutical, personal care, agriculture, logistics, food & beverage, hospitality, e-commerce, automotive, construction among others. These innovations include:

- Lignocellulosic materials
- Materials out of fractionation of biomass
- Advanced materials from cellophane/cellulose
- Wood-based biopolymers and biochemicals
- Other advanced bio-based materials
- Bio-based foam
- Fluorochemical-free fibres
- Sugarcane waste
- Soy molasses
- Wood pulp
- Other side streams-based materials
- High-quality saturating base kraft paper
- Barrier coatings suitable for paper and paperboard for food applications
- Water-based dispersion coated barrier boards

2.3. Industry Targeted Approach

European countries—such as the United Kingdom, Germany, France, Italy amongst others—have not only been one of the largest consumers of plastic, but also are the largest producer of plastic wastage in the world. The packaging industry accounts for 40% of the demand for plastics in Europe[1]. According to the European Commission, 61% of the 30 million metric tonne of plastic waste generated in 2019 was attributed to the packaging industry.

Recycling of plastic waste accounts for 32.5% of the plastic waste treatment in Europe[1]. Landfilling and incineration accounting for 25% and 43%, respectively[1].

Directives and policies—such as EU's Single-use Plastic Directive, EU Packaging Directive, EU's Circular Economy Action Plan, EU Green Deal, and the Circular Plastics Alliance—have brought about a considerable increase in the rate of recycling of plastics across the European countries. This can be observed in the case of Finland, as well. In 2010, the country recycled only 26% of its plastic waste[1]. In 2019, the share of recycled plastic increased to 31%[1].

Furthermore, following its own roadmap to a Circular Economy, Finland identified the primary sectors that contribute to creating plastic packaging waste in the country vis., food & beverages, pharmaceuticals, e-commerce. Finland's research-based start-ups have been a core element in piloting and developing new technologies that can replace plastic with biomaterials.

After having identified the needs of the sectors, Finnish companies have developed specific products that can cater to the needs of each targeted industry mentioned before. For example, Kotkamills and Pyroll Packaging uses cellulose derived from wood pulp to develop 100% plastic-free packaging material. Their targeted industries include food & beverages and industrial packaging.

On one hand, this targeted approach has allowed Finnish companies to strengthen their value chain. On the other hand, it has given them the opportunity to develop strong business propositions for expanding into the global market. Globally acknowledged, new SMEs that produce biobased packaging materials—such as Lumir, Montisera, Onbone, Paptic, Spinnova, Sulapac, Wallplus, Welmu International amongst others—are a testament to a strong Finnish business proposition in sustainable packaging.

The next section explores these business propositions.

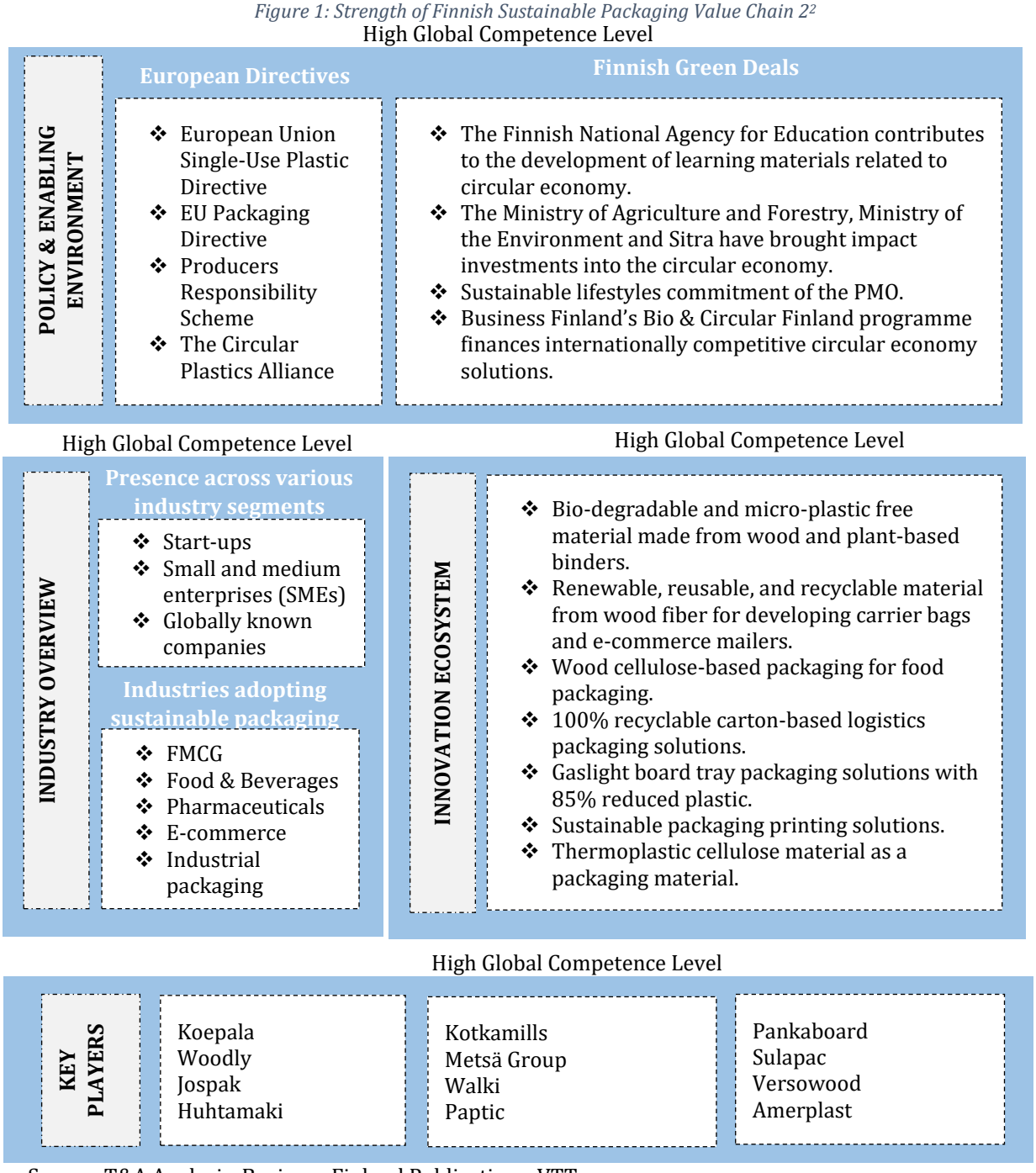
2.4. Strength of Finnish Packaging Value Chain

In order to determine the strength of Finnish value chain, four parameters were analysed viz. support policy and regulatory framework, industry positioning, innovation ecosystem, and key players in the global market. Each of the parameters—and their subsequent key performance indictors (KPIs)—were ranked on a scale of 1 to 10, 1 being the lowest and 10 being the highest. Based on the rating, each parameter was given an average score and then determined to be of high, moderate, or low global competence.

The following figure illustrates the same.

[1] Eurostat, *Packaging waste statistics,* October 2021

Figure 1: Strength of Finnish Sustainable Packaging Value Chain 2[2]



Source: T&A Analysis, Business Finland Publications, VTT

High level of global competence (Rating: Above 8)

Medium level of global competence (Rating: 5

Low level of global competence (Rating: Below 5)

[2] EU Single-Use Plastic Directive was adopted by the EU to implement the regulatory schemes that advance the EU Plastic Strategy and EY Circular Economy Plan.
EU Packaging Directive lays down that all materials used for industrial, commercial, household and other purposes should avoid single-use packaging, packaging wastes, promote reuse, recycle and recovery of waste.
Circular Economy Action Plan was adopted in March 2020 to lay down the agenda for sustainable growth. It is one of the main building blocks for the EU's Green Deal.
The Circular Plastics Alliance is committed to boosting the EU market for recycled plastics to 10 million tonnes by 2025. The alliance covers the full plastic value chain and includes 300 organisations representing industry, academia, and public authorities.

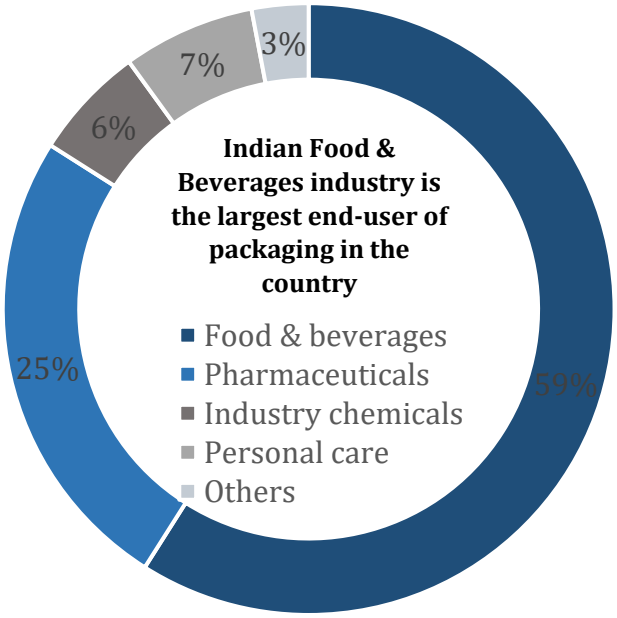
3. Indian Sustainable Packaging

3.1. Overview of the Indian Packaging Industry

The Indian packaging industry is expected to grow at a CAGR of ~27%
(Source: Packaging Industry Association of India (PIAI))

Indian packaging industry is the **5th** largest sector in the Indian economy (Source: PIAI)

India accounts for about **~4%** of the world packaging industry
(Source: PIAI)



Source: Export Import Bank of India, (Exim Bank)

3.2. Plastic waste management leading the way to adoption of Packaging 2.0

3.2.1. Plastic consumption in India

Packaging applications have emerged as one of the biggest consumers of the plastic produced, contributing to ~ 60% of India's total plastic consumption[3]. In India, currently, packaging consumes ~10 million tons of plastic every year[3]. Approximately 70% of plastic packaging (mostly meant for single use) converts into waste in a short span[3].

Currently, India has one of the lowest per capita consumptions of plastic in the world. India's per capita per annum consumption is 13.6 Kgs compared to the world's average of about 30 Kgs, about 2 times of India's per capita consumption[4].

3.2.2. Informal sector leading waste recycling and recovery

In India, approximately 60% of plastic waste is collected for recycling and recovery, which is much higher in comparison to developed countries[5]. The global average of plastic waste being recycled is around 15%, it is estimated to be 30% in most countries in the EU and only about 10% in the US. However, this is attributed to the high number of informal waste collection mechanisms[5]. High-value plastic like polyethylene terephthalate (PET) bottles and shampoo bottles, made of high-density polyethylene (HDPE), are sorted by waste pickers before the waste is taken to the dump yard, but the

[3] India's plastic waste generation has more than doubled in 5 years, Live Mint, December 2021
[4] Circular Economy for Plastics in India, Teri University, 2021
[5] Plastic Waste Management, Ministry of Housing and Urban Affairs, Government of India, March 2019

low-value items like plastic carry bags, candy wrappers, tobacco and pan masala sachets, soap wrappers and shampoo sachets are ignored as they are either too difficult to collect or have very low market value.

In India, PET and PE represent ~50% of the plastic consumption in the packaging applications and their recycling streams are well established[6]. This represents a significant potential to explore transition towards bio-based PET and biobased PE to decouple plastic usage from fossil-based resources and decarbonize the packaging industry.

Open loop recycling is most prevalent i.e., when the recycled material is used in lower grade plastic applications. For example, PET from beverage bottles being used in fibers rather than in packaging bottles.

3.2.3. Problematic packaging applications in India

Problematic packaging applications include plastic grocery bags, plastic cups and lids, expanded polystyrene (EPS) food containers, and PVC-based packaging.

Only 0.8% of the plastic packaging is manufactured using renewable bio-based feedstock.[7]

3.2.4. Food delivery sector holds high potential for adoption of bioplastics

Around 22,000 tons of plastic waste is created every month through orders on food delivery platforms, a significant portion of which is plastic packaging waste[8]. The customer base of online food delivery industry in India is projected to expand 1.5 times that of current levels to 300 million users in 2025[9].

Additionally, garbage bags account for ~8% of the plastic waste generated per day[10]. Currently 60 million tons of municipal solid waste is generated per year. This is steadily growing at 4% CAGR and so is the need for garbage bags[11].

Given that plastic packaging used in food delivery and garbage are both contaminated with organic content, they are most likely to be seen ending up in landfills. Therefore, transitioning to bio-based compostable plastic packaging for these applications presents a viable opportunity.

3.3. Paradigm Shift: Packaging 1.0 to Packaging 2.0

India follows a traditional growth model, where resource consumption is directly proportional to the growth of the economy. One of the implications of the traditional growth model can be seen in the rapid increase of plastic consumption in the country. As middle-income groups and their rising income level push up the consumption of FMCG products, e-commerce, pharmaceuticals, food & beverages amongst others, the annual plastic consumption of the country stands at ~10 million tons[12]. 59% of the total plastic consumed is attributed to the packaging industry[12].

India's plastic waste management ecosystem is primarily dominated by the prevalence of low-value plastic waste managed by a large unorganised and informal sector. ~60% of the plastic waste collected is recycled.[13] ~1.5 million informal waste pickers contribute largely to the waste collection method in place in the country.[14] Therefore, both low-value and high-value plastic waste collected is not optimally channelised. This is estimated to create a material loss worth ~USD 133 billion.[15]

[6] Plastic Waste Management, Ministry of Housing and Urban Affairs, Government of India, March 2019
[7] Circular Economy for Plastics in India, Teri University, 2021
[8] FSSAI (Food Safety and Standards Authority of India)
[9] Food delivery platforms must check the plastic waste that they generate, Hindustan Times, June 2019
[10] Press research
[11] Press research
[12] Packaging Industry Association of India
[13] UNEP Data
[14] Press research
[15] Strategies for Sustainable Packaging in India, FICCI-Accenture, October 2020

Till now, the actions to mitigate the problem at hand included only waste management aspects such as recycling, littering and landfills. To diversify the action plan, the Indian government has taken evidence-based mechanisms steps to mitigate the waste generation and improve its management. For instance, the Plastic Waste Management Rules-2016 introduced the concept of Extended Producer Responsibility (EPR). In June 2020, the Unified framework for EPR proposed three implementation models—plastic credit, Producers Responsibility Organisations (PRO), and setting up a fee-based mechanism—which are currently under discussion. This includes system of plastic credit, through Producer Responsibility Organizations (PRO) and setting up a fee-based mechanism. The new draft framework also has provisions to impose stringent penalties on producers if they fail to meet their targeted collection.

On the other hand, the private sector in India has been focusing on both, innovation of sustainable products and collection and recycling of plastic waste. Recent plastic waste management related commitments of large-scale FMCG, Pharmaceuticals, Food & Beverages, E-commerce companies are aimed at reducing the usage of plastic packaging. The following table illustrates a few examples of the commitments made.

Table 1: Commitments by large-scale companies in India with respect to adoption of sustainable packaging

Company	Public Commitments and Targets
Unilever	❖ Move to 100% reusable, recyclable, or compostable plastic packaging by 2025 ❖ Reduce the use of virgin plastic by 50% by 2025
Pepsico	❖ Design all packaging to be recoverable or recyclable, and to support increased recycling of plastic waste ❖ Reduce the use of virgin plastic by 35% by 2025
Marico	❖ Targets to move to 100% recyclable plastic usage by 2025 ❖ Usage of zero PVC in packaging by 2022
Dabur	❖ 100% collection of plastic waste generated through packaging
Nestle	❖ Target 100% recyclable or reusable packaging and reduce the use of virgin plastics by one third by 2025
ITC	❖ Ensure 100% reusability, recyclability, and compost ability of 100% of their product packaging in the next decade

Source: Industry reports, Press research, Company websites

This indicates a transition from attractive packaging to meet the shelf impact goals of competing brands to adoption of sustainable packaging, in order to meet the government directives and the collective conscience of the aware consumer in the country. Indian packaging industry is undergoing a paradigm shift from Packaging 1.0 to 2.0, where the latter indicates an increasing adoption of sustainable packaging across various industries.

3.4. Indian Sustainable Packaging

3.4.1. Market overview of sustainable packaging in India

The India sustainable packaging material industry is at a nascent stage. It is dominated by start-ups with a focus on environmental protection and an annual turnover in the range of USD 0.15 million to USD 0.30 million. Only a handful of active players are equipped with proper certifications. These players are primarily involved in the production of carry bags, shoe bags and tableware.

The raw material used by these manufacturers are mostly starch based products sugarcane bagasse, and bamboo commonly categorised as Bioplastics. PLA (Polylactic acid) is the most common bioplastic in use in India. Raw materials used in the manufacturing of bioplastics such as PLA, PHA, starch, and PBS have volatile prices in India.

The Alternative Packaging Manufacturers in India conduct product distribution through their in-house sales teams and in some cases also have tie-ups with a single distributor.

While home-grown companies such as Ecoware Solutions Pvt. Ltd., House of Folium, Bambrew, among others are known for using bamboo, sugarcane pulp and vegetable starch to develop biodegradable packaging solutions, Bengaluru-based company Packmile Pvt. Ltd. focuses on sustainable packaging with paper solutions.

Indian FMCG, Food & Beverage industry and E-commerce are the early adopters and the largest potential market for sustainable packaging.

During the pandemic, Indian FMCG companies such as Reckitt and Diageo India launched their limited-edition eco-friendly packaging to gauge its feasibility in the Indian market. Similar trends in the adoption of sustainable packaging were seen across segments of the FMCG sector in India. For example, companies like Marico Limited, Bacardi India Pvt Ltd, ASICS India Pvt Ltd, Hindustan Unilever Limited, Nestlé India Ltd., PepsiCo, Inc., amongst others target to attain 100% recyclable packaging by 2025.

For example, Zomato, a food delivery app in India, has plans to use 100% biodegradable units such as bamboo, paper, palm leaf, etc, to avoid the usage of single-use plastic. The company has been trying to sell biodegradable packaging solutions to its registered partners for the same since 2019.

PepsiCo India aims to cut down the use of virgin plastic by ~35% across its beverages portfolio by 2025 and is planning to introduce 100% recyclable and bio-degradable packaging material.[16]

Amazon India has eliminated the use of single-use plastic in packaging solutions across all fulfilment centers in India.[17]

The early adoption of sustainable packaging clubbed with the high growth trend of the industries mentioned before, Indicates a large potential market for sustainable packaging in the country. While on one hand, the Indian e-commerce industry is expected to reach ~USD 350 billion by 2030[18], on the other hand, the Indian packaged food market was worth ~USD 33-35 billion as of 2021 and is expected to double by 2030.[19]

Furthermore, the growth of the Indian food delivery sector is a testament to the mounting potential in the country. The sector is expected to reach ~USD 21 billion by 2025.[20]

3.4.2. Market segments of sustainable packaging in India

3.4.2.1. Bioplastics: The dominant segment in India sustainable packaging

Bioplastic has emerged as one of the most popular segments in the Indian sustainable packaging value chain. The market for bioplastic is expected to reach ~USD 750 million by 2025.[21] With a CAGR of 24% the market size is expected to quadruple in the next 5 years.

The segment is dominated by new-age start-up firms in the country due to interest to fund the search for new and alternate bio-based renewable materials used for packaging in India.

PLA (Polylactic acid) is the most common bioplastic in use in India. First, corn or other raw materials are fermented to produce lactic acid, which is then polymerized to make PLA. To improve their tensile strength, bioplastic polymers can be blended with their co-polymers or with other polymers.

Other bioplastics uses in India include PLA, PHA (Polyhydroxyalkanoates), starch, and PBS (Polybutylene succinate).

Raw materials used in the manufacturing of bioplastics such as PLA, PHA, starch, and PBS have volatile prices in India. The widening of the demand-supply gap has led to substantial increase in the cost of raw

[16] 'PepsiCo to reduce plastic use, launch plant-based snacks in green push', Reuters, 16 September 2021
[17] 'Moving towards plastic-free packaging', Amazon India, 18 May 2020
[18] Invest India, India: Fastest growing e-commerce market in the world, 2021
[19] Indian packaged food market to be double in 5-10 years', Business Standard 26th February 2021
[20] Euromonitor statistics, accessed on December 2022
[21] Industry reports

materials. The relatively higher price of bioplastic polymers with respect to traditional plastics is a significant restriction for widespread use of these materials. Lack of commercial progress in developing bio-based plastics are driving up prices of bioplastic polymer. Additionally, the manufacturing process of bioplastics is capital intensive and time consuming.

The current custom duty on import of PLA is 32.16% (all inclusive) and it is estimated that manufacturing in India can bring down the price by 25-30%.

3.4.2.2. Classification of Indian sustainable packaging based on technologies being used

The following table illustrates the different segments of sustainable packaging, currently present in India.

Table 2: Market segments of Indian sustainable packaging

Sustainable Packaging Segment	Sub-segments based on technologies used in each segment
Plastic-based packaging solutions	❖ Compostable bioplastics (PLA, PHA, PBS) ❖ Non-compostable bioplastics ❖ Compostable fossil-based plastics (Bio-PET, Bio-PE)
Paper-based packaging solutions	❖ Kraft paper packaging ❖ Cardboard packaging ❖ Paperboard packaging ❖ Composite paper packaging
Innovative fibre-based packaging	❖ Bamboo-based packaging ❖ Cellulose from wood-fibre-based packaging
Eco-waste-based packaging	❖ Sugarcane-based packaging ❖ Wheat-straw-based packaging
Textile-based packaging	❖ Polyolefin-based packaging ❖ Leno-based packaging ❖ Jute hessian-based packaging ❖ Jute based packaging
Metal-based packaging	❖ Aluminium-plates ❖ Tin-plate, Steel packaging

Source: T&A Analysis

3.4.3. Growth drivers

3.4.3.1. Retail Growth

The Indian retail market is largely unorganized. It is expected to reach ~USD 1.5 trillion by 2022[22]. However, the organised Indian retail market has increased by ~50% between 2012-2020 to its current value of nearly 12% of total retail[22]. Furthermore, the modern Indian retail industry is expected to grow at a 15% CAGR to reach 18% by 2025[22].

Increased presence of global multinational companies has boosted the demand in the processed food, beverages, cosmetics, consumer products, toiletries, and pharmaceutical sector. continuously through newer retail models. This has widened the market and increased the demand of packaging products.

The growing nature of the retail industry and the government directives regarding achieving sustainability in both production and the end-products have been pushing companies towards adopting alternative packaging technologies. For example, Adani Wilmar—and FMCG manufacturer in India—replaced the plastic packaging of its most popular brand, Fortune cooking oil, with 100% recyclable plastic.

[22] Invest India, Government of India

3.4.3.2. E-commerce Growth

In the first half of 2021, e-commerce accounted for nearly a third of several electronic categories, almost half of smartphones sold, and about a fifth of all apparel sales in India[22]. In 2020, e-commerce and consumer internet companies raised more than USD 8 billion in PE/VC capital across 400 deals[22].

India is expected to become the 3rd largest online retail market by 2030, with an estimated annual gross merchandise value of ~USD 188 billion[22].

Both paper and plastic packaging dominates this sector. However, an analysis of the recent trend shows that e-commerce giants like Amazon, Flipkart, Nykaa, Myntra amongst others adopting measures to reduce the use of plastic packaging across their fulfilment centres in the country. Both Amazon and Flipkart have done away with single-use plastics across all of their fulfilment centres in India. For some geographies—where economies of scale are favourable—Myntra sources its packaging material from Bambrew, an Indian start-up making paper from bamboo. Similar to Myntra, Nykaa has done away with the usage of plastic bubble wraps for packaging of fragile products.

3.4.3.3. Growth in the Food Delivery Sector

In 2019, online food delivery accounted for 15% of the organised food retail market in India[23]. In 2020, India's online food delivery market was valued at approximately ~USD 5 billion[23]. The segment is expected to grow at a CAGR of 28%.[24]

While Tier 1 cities—Delhi, Mumbai, Bengaluru, Kolkata, Chennai, Hyderabad, Pune amongst other—make up about 70% of the business[24]. However, observing the potential for expansion in Tier 2 cities, Zomato and Swiggy—two dominant players in the market—expanded to more than 400 cities by the end 2020[23].

The expansion brought about a need to scale up sustainability across their value chains-packaging being a primary concern. While they aim to do away with the usage of single-use plastic—in accordance with government's ban from July 2022 onwards, these players have also started supplying alternative packaging to some of its restaurant partners. For example, Zomato has partnered with Bambrew, an Indian start-up making paper from bamboo—to provide sustainable packaging to interested partners.

[23] The Strong Growth of India's Food Delivery Sector Will Likely Continue, GLG, June 2021
[24] Zomato IPO: How do Indian food delivery players match up to global peers, Business Standards, July 2021

4. Start-up Ecosystem Leading Packaging 2.0

4.1. Overview

India has the 3rd largest start-up ecosystem in the world[25]. The country has ~50,000+ start-ups—~9,000 operating in the technology and innovation—and is expected to witness an annual growth of 12-15%[25]. The underlying enablers include increased smartphone and internet penetration, cloud computing, application programming interfaces (APIs), and a national payments stack in place.

Additionally, propelled by the Covid-19 pandemic, India witnessed an increase in the number of Unicorn start-ups—having a valuation of ~USD 1 billion—in 2021.

Start-ups rely largely on market access and possibilities to identify consumer behaviour. Government initiatives such as the Aadhaar biometric ID system—introduced in 2009—has allowed start-ups to validate information about their customers and innovate products specific to the market's demand and need.

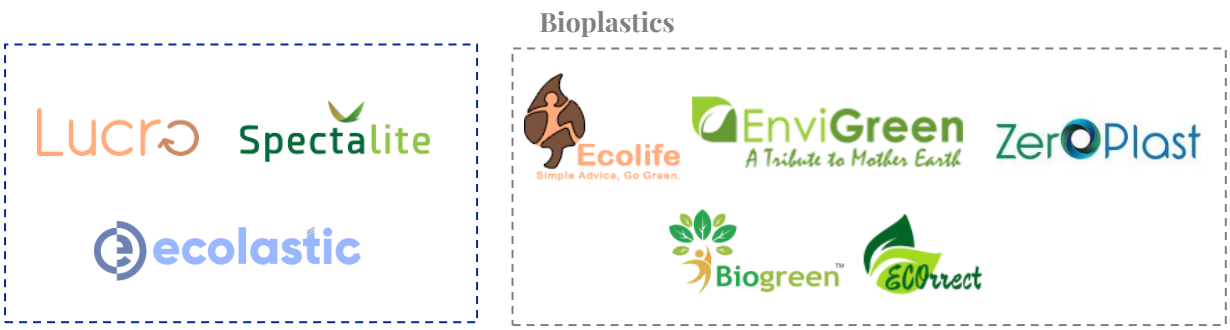
4.2. Start-ups in Indian Sustainable Packaging

The Indian sustainable packaging ecosystem is dominated by start-ups and SMEs. Currently, India is home to ~20 start-ups manufacturing sustainable packaging in the country. 3 out of 20 companies—viz Bollant Industries, Bambrew, and Lucro—have received funding.

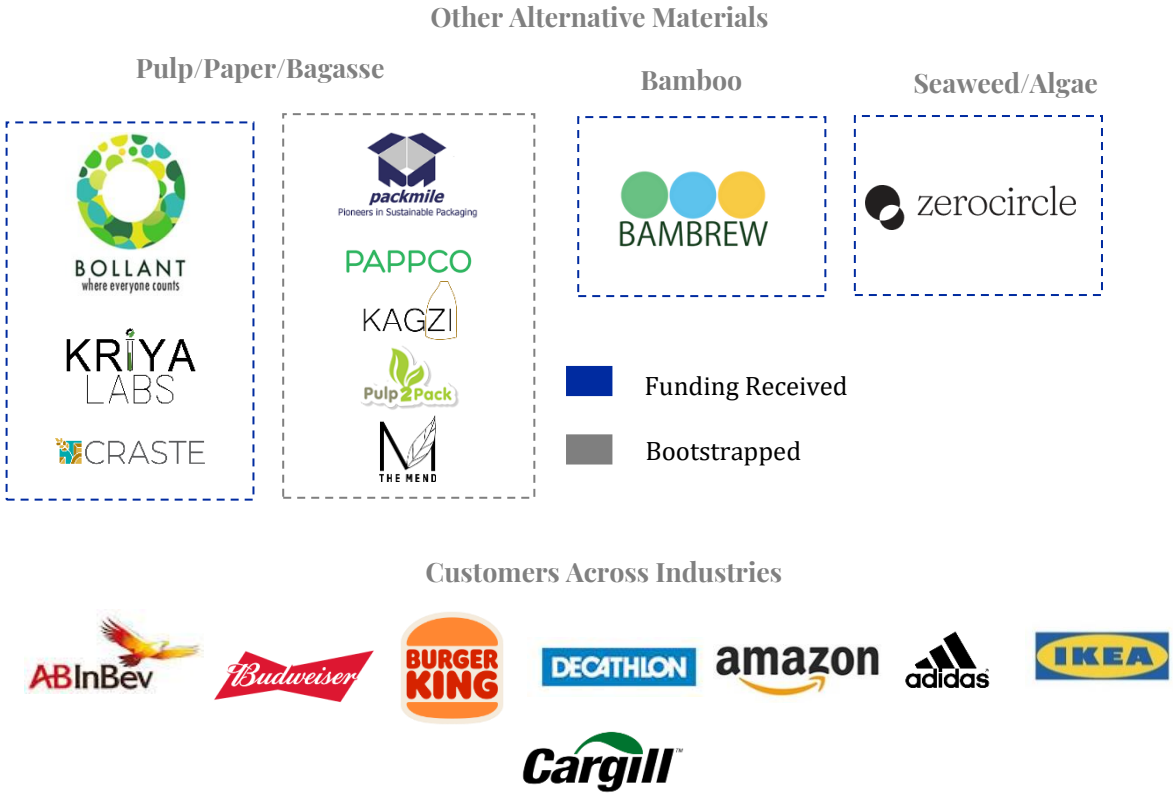
Furthermore, individual entrepreneurs have also been making a mark in this segment. For example, a Coimbatore-based entrepreneur has innovated a machine that churns out bio-degradable single use cutlery from banana leaves, wheat, rice bran, and millet waste.

Indian MNCs like ITC have collaborated with Startup India—a flagship initiative of the Government of India—to promote, facilitate, and crowdsource innovative ideas for plastic substitution. Under the collaboration, ITC launched the ITC Sustainable Innovation Challenge. The challenge aims to support innovative start-up ideas on sustainable packaging and smart waste management solutions. For sustainable packaging, ITC has invited ideas to replace plastic-based products with compostable plastic, molded wood fibre-based packaging, and packaging material from agricultural waste.

Figure 3: Start-up ecosystem landscape in India



[25] Startup India, Government of India



- Sustainable packaging start-ups in India are exploring multiple materials besides bioplastics, especially paper and bagasse
- Small ticket (<USD 5 million) fundraises have been witnessed in the segment over the last 3-4 years
- Multiple start-ups in the domain founded as social enterprises. Strong interest from impact investors and
- Besides government grants and sustainability focused investors, large multinationals operating in the country have been the key supporters of such start-ups through pilot projects. These include customers from multiple industries such as food & beverage, retail, and automotive.

The following table illustrates a few examples of sustainable packaging start-ups in the country:

Table 3: Examples of start-ups in sustainable packaging in India

Name of the Startup	**Sustainable Packaging Value Chain**
Ecoware India	❖ **The company was founded in 2009** ❖ **Business Model:** B2B ❖ **Sales & Distribution:** 12 sales partner globally, 23 distributors, 500+ point of sales stores in India ❖ **Funding:** Unfunded ❖ **Product range**: 100% biodegradable and compostable packaging and tableware ❖ **Technology used**: Sugarcane bagasse and biomass turned into packaging i.e. Eco-waste based packaging ❖ **End-user segments:** FMCG, Food delivery sector, Food & Beverages, E-commerce ❖ **Clients**: Subway, Chaayos, Haldiram's, FabIndia, FabCafe amongst others

Name of the Startup	Sustainable Packaging Value Chain
	❖ **Certifications received:** 19+ certifications that include Singapore Environment Council Green Label, Aerobic Biodegradation ISO 17088, FSSAI compliance, and National Restaurants Association of India
Schmancy	❖ The company was founded in 2016 ❖ **Business Model**: B2B, B2C ❖ **Sales & Distribution**: Online store ❖ **Funding:** Unfunded ❖ **Product range:** 100% biodegradable customised gift packaging, food boxes, brown boxes, liquid containers, tall cake boxes ❖ **Technology used:** Paper derived from recycled paperboards ❖ **End-user segments:** FMCG, Food delivery sector, Food & Beverages, E-commerce ❖ **Clients:** Curefit India, ChaiPoint, HattiKappi, SodaBottleOpenerWala, Socials, Zivame amongst others ❖ **Certifications received:** Food packaging is FSSAI certified, packaging raw material sourcing is certified by Forest Stewardship Council.
Craste	❖ The company was founded in 2018 ❖ **Business Model:** B2B ❖ **Sales & Distribution:** Sales partners and distributors ❖ **Funding Sources**: BIRAC SOCH Award, Biotech Ignition Grant (BIRAC), and AB InBev Grant, Central government grant under RAFTAAR scheme where it partners with Punjab Agriculture Unit, Ludhiana ❖ **Product range:** 100% biodegradable packaging material and engineered boards for furniture, particle boards, custom-made packaging solutions ❖ **Technology used**: Lignin from crop-residue ❖ End-user segments: Food & Beverages, E-commerce ❖ **Clients:** Not available
Kagzi Bottles	❖ The company was founded in 2018 ❖ **Business Model:** B2B ❖ **Sales & Distribution:** Sales partners and distributors ❖ **Funding Sources**: Unfunded ❖ **Product range:** 100% biodegradable and compostable bottles, paper seals, corks ❖ **Technology used**: Wastepaper pulp ❖ **End-user segments:** Food & Beverages ❖ **Clients:** Not available
Envi Green	❖ The company was founded in 2012 ❖ **Business Model:** B2B ❖ **Sales & Distribution:** Sales partners and distributors ❖ **Funding Sources**: Unfunded ❖ **Product range:** Carry bags, trash bags, oil sachets, bin liners, wrapping covers, laundry bags, packaging films ❖ **Technology used**: Packaging materials made from natural starch and vegetable oil derivatives ❖ **End-user segments:** FMCG, Home retail, Industrial manufacturing, E-commerce ❖ **Certifications:** Central Institute of Plastics Engineering & Technology, Karnataka State Pollution Control Board, Shriram Institute for Industrial Research, Karnataka State Pollution Control Board ❖ **Clients:** Not available

Name of the Startup	Sustainable Packaging Value Chain
Bambrew	❖ The company was founded in 2018 ❖ **Business Model**: B2B, ❖ **Sales & Distribution:** The company offers subscriptions to its products along with shipping and delivery through its online store ❖ **Funding:** 11 investors ❖ **Product range:** 100% biodegradable food boxes, standup pouches, and courier packages ❖ **Technology used:** Bamboo fibre ❖ **End-user segments:** FMCG, Food delivery sector, Food & Beverages, E-commerce ❖ **Clients**: Myntra, Zomato, Olive Bar and Kitchen, The Fatty Bao restaurant, Big Basket, Hatti Kappi amongst others. ❖ **Certifications received:** Food packaging is FSSAI certified

Source: Tracxn, T&A Analysis

5. Indian Market Opportunity Assessment

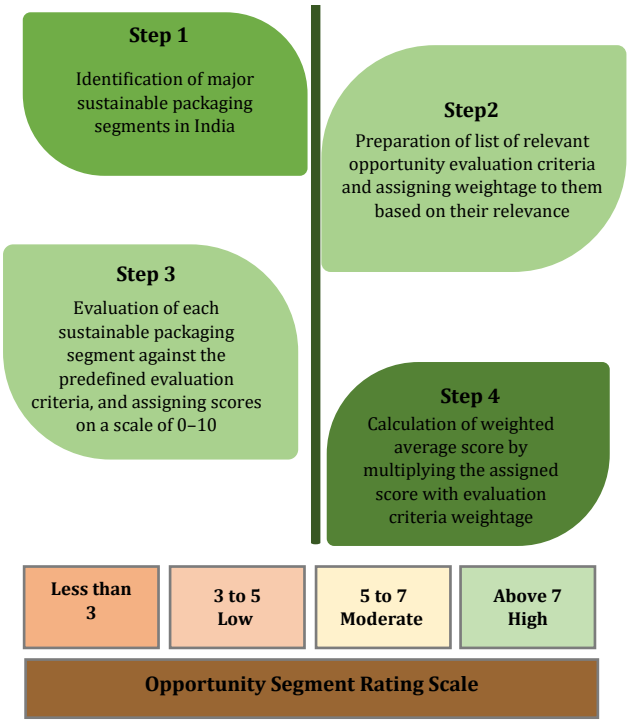
5.1. Methodology

To identify and evaluate the commercial opportunities for Finnish sustainable packaging solutions in the Indian market, T&A analyzed six major industry segments viz *plastic-based sustainable packaging solutions, paper-based sustainable packaging solutions, innovative fibre-based packaging, eco-waste- based packaging, textile-based packaging solutions, and metal-based packaging.*

The opportunity evaluation criteria comprised evaluating seven parameters viz *demand outlook, Finnish competitive advantage, intensity of market competition in the segment, market capitalization and potential for Finnish companies, government policy and support, maturity of existing value chain, and expected cost competency for Finnish companies.*

Based on the opportunity assessment, each sustainable packaging segment was assigned a weighted average score. The weighted average score indicates the market potential for Finnish innovations in the Indian market. The segments that received a score reflective of medium to high potential were analysed further for specific opportunities.

Figure 4: Methodology for Opportunity Assessment



5.2. Evaluation Criteria

Table 4: Evaluation criteria for Opportunity Assessment

S. No.	Criterion	Weightage	Description
1.	Demand outlook/ Potential for Finnish solutions	15%	This refers to the demand potential and outlook for Finnish sustainable packaging solutions in India, in relation to existing alternatives in the market, including legacy technologies, in-house solutions used by businesses and alternatives to Finnish technologies. *A higher score here means a higher potential for sustainability of demand in the Indian market.*

S. No.	Criterion	Weightage	Description
2.	Finnish competitive advantage	20%	This refers to the ability of Finnish firms to offer differentiated products—in terms of quality, performance, scope, scale, or pricing—to the Indian market. *A higher score here indicates stronger unique selling propositions for Finnish companies in the given segment in India*.
3.	Intensity of market competition in the segment	15%	This refers to how crowded the market is, i.e. the number of direct competitors, domestic or foreign, operating in the given sustainable packaging segment in India. *A higher score here means lower competition for Finnish companies in the given segment in India.*
4.	Market capitalization potential	15%	This refers to the extent of market capitalisation—vis-à-vis addressable market size, its growth potential, acceptability in the market—likely to be achieved by Finnish businesses in each segment. *A higher score here indicates a higher potential for market capitalisation for Finnish sustainable packaging solutions in India.*
5.	Government policy support	10%	This refers to the support of government—including sustainable policies and schemes, financing support among others—for companies operating in each segment. *A higher score denotes higher support from the government.*
6.	Maturity of existing value chain	15%	This refers to the level of maturity of the existing value chain in sustainable packaging and its segments in the country. *A higher score here indicates a higher potential for Finnish businesses.*
7.	Expected cost competency for Finnish companies	10%	This refers to the expected cost competency of Finnish sustainable packaging propositions vis-à-vis their Indian counterparts. *A higher score denotes a higher cost competency for Finnish businesses.*

5.3. Opportunity Mapping

As per the opportunity potential analysis, the following inferences can be made:

- **Innovative fibre-based packaging solutions form the segment that offers the maximum potential to Finnish packaging companies in the Indian market.** The segment has an opportunity score of 6.6 which falls into the moderately high potential category.

- **Plastic-based packaging solutions (including bio-based plastic materials) offer the second opportunity potential with a score of 6.5.**
- Metal-based packaging segment scores moderately low with a score of 4.6 followed by textile-based packaging (solutions based on jute, polyolefin, leno, etc) with an opportunity potential score of 4.3.

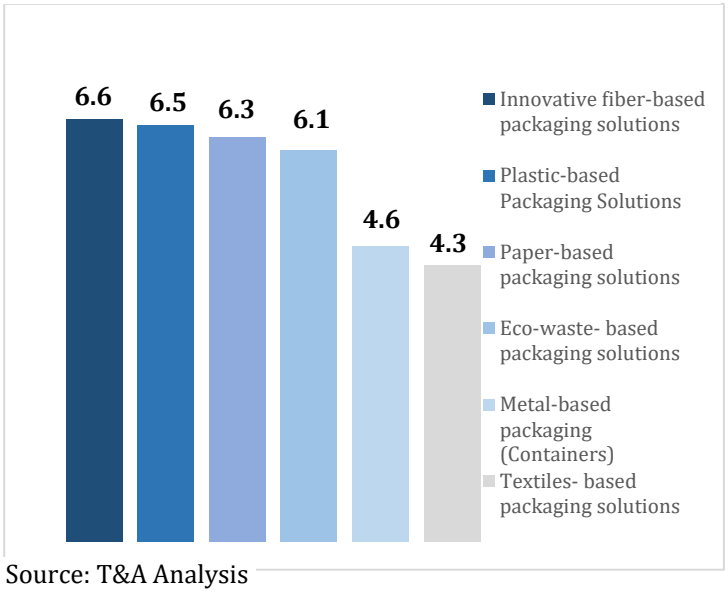
Table 5: Opportunity Mapping of Indian Sustainable Packaging Industry

Packaging segment in India	Sectoral Potential calculation for Finnish companies on various packaging segments in India									
	Rating scale	*Factors Determining Sectoral Potential (rated on a scale of 1 – 10, with 10 being the highest and most favourable rating, and 1 being the lowest and the most unfavourable rating)*								
	Criteria weightage	*15%*	*20%*	*15%*	*15%*	*15%*	*10%*	*10%*	**Potential score (Based on Weighted Average scores)**	
	Sub segment	Demand Outlook (next 10 years)	Finnish Competitive Advantage	Intensity of market competition in the segment	Market capitalization potential for Finnish companies	Government Policy support	Maturity of existing Value chain	Expected cost competency for Finnish companies	**Oportunity Potential (Sub Segment)**	**Oportunity Potential (Segment)**
Plastic based Packaging Solutions	Bio-based compostable plastic packaging (PLA, PHA, PBS)	1.5	2	1.2	1.5	0.9	0.6	0.5	8.2	6.5
	Fossil-based compostable plastic packaging (PBAT,PCL)	0.9	1.2	0.9	0.9	0.6	0.75	0.3	5.6	
	Fossil-based non compostable plastic packaging (PET, PP, PE)	0.75	1	0.15	0.9	0.4	1.05	0.3	4.6	
	Bio based non compostable plastic packaging (Bio-PET,	1.35	1.8	1.2	1.35	0.7	0.75	0.5	7.7	
Paper based packaging solutions	Kraft paper based packaging	1.2	1	0.45	1.05	0.6	0.9	0.3	5.5	6.3
	Cardboard based packaging	1.35	1	0.45	1.05	0.6	0.9	0.3	5.7	
	Paperboard based packaging	1.35	1	0.6	1.05	0.6	0.9	0.3	5.8	
	composite paper based packaging	1.35	1.6	0.9	1.35	0.6	0.6	0.5	6.9	
Innovative fiber based packaging solutions	Bamboo based packaging	1.05	1.2	1.05	1.05	0.9	0.45	0.5	6.2	6.6
	Cellophane/cellulose packaging	1.05	1.8	1.05	1.05	0.9	0.6	0.5	7.0	
Eco waste based packaging solutions	Sugarcane-based packaging solutions	1.05	1.2	1.05	0.9	0.9	0.6	0.4	6.1	6.1
	Wheat straw based packaging	1.05	1.2	1.05	0.9	0.9	0.6	0.4	6.1	
Textiles based packaging solutions	polyolefin-based packaging	0.75	0.8	0.6	0.45	0.5	0.75	0.3	4.2	4.3
	Leno based packaging	0.75	0.8	0.6	0.45	0.5	0.75	0.3	4.2	
	Jute hessian based packaging	0.75	0.6	0.6	0.6	0.6	0.9	0.4	4.5	
	Jute based packaging	0.75	0.6	0.6	0.6	0.6	0.9	0.4	4.5	
Metal based packaging (Containers)	Aluminum based packaging	0.9	0.8	0.75	0.6	0.5	0.9	0.3	4.8	4.6
	Tin plate based packaging	0.9	0.8	0.75	0.6	0.5	0.9	0.3	4.8	
	Steel based packaging	0.6	0.8	0.75	0.45	0.5	0.9	0.3	4.3	

19 different sub-segments were mapped under the six broad sustainable packaging segments in India. As per the opportunity analysis, the following inferences were made:

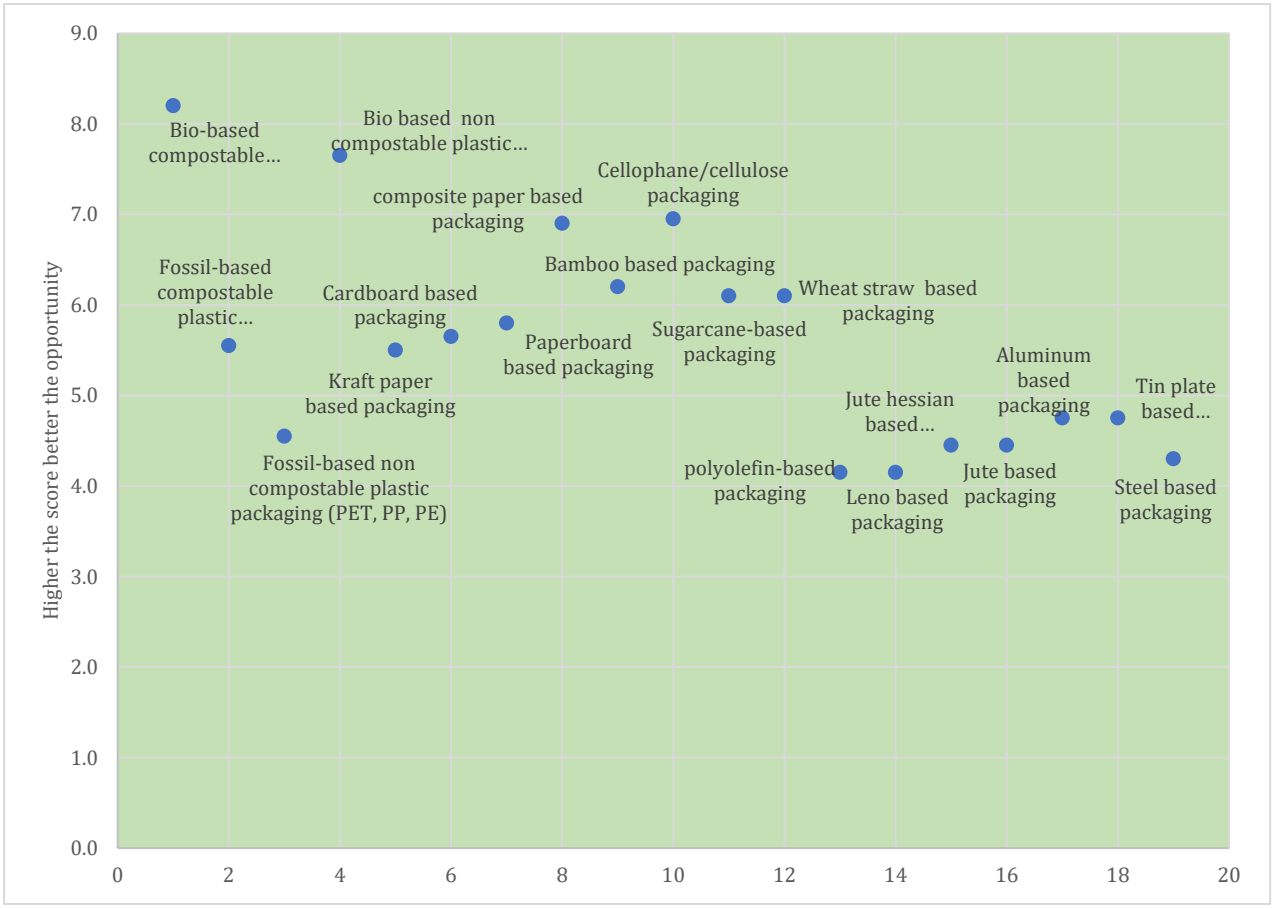
- **With a score of 8.2, innovative bio-based packaging sub-segments** were found to be the most attractive target segment
- Other sub-segments of interest include bio-based non-compostable plastic packaging (7.7/10) followed by cellophane/cellulose-based packaging (7/10) and composite paper-based packaging (6.9/10), to name a few.

Figure 5: Segments with high to moderate opportunity potential in Indian sustainable packaging



Source: T&A Analysis

Figure 6: Indian sustainable packaging sub-segments and their potential for Finnish business



Source: T&A Analysis

6. Market Segment of Interest

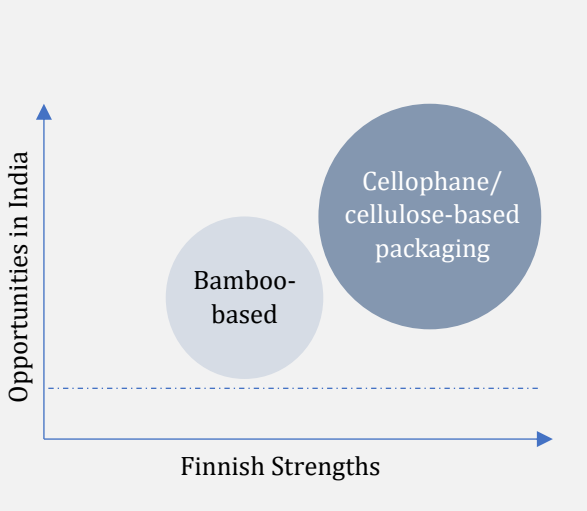
The opportunity potential analysis showcases 4 segments—innovative fibre-based solutions, plastic-based sustainable packaging solutions, paper-based packaging, and eco-waste packaging solutions—as potential market segments of interest.

These segments have been analysed in detail further.

6.1. Innovative Fibre-based Packaging

Innovative fibre-based packaging solutions are a growing segment in India's predominantly plastic and paper-based packaging industry. Commonly used fibres include cellophane/cellulose from wood pulp, bamboo and wood fibre among others.

The segment is dominated by the presence of domestic SMEs and a few foreign brands. For example, Bambrew, an Indian bamboo-based packaging solutions company, manufactures and supplies 100% handmade, reusable and biodegradable packaging made from bamboo. The company discarded the use of precious hardwood for developing paper pulp and adopted bamboo as an alternative. Foreign companies include the likes of Huhtamaki Oyj which is a major player in the market.



Owing to the expanding nature of the Hotel/Restaurant/Café (HoRECa) industry, particularly the food delivery sector and the boom in e-commerce, these were observed to be the target clientele of companies operating in this segment.

It will be worthwhile to mention that the Indian market is traditionally cost-sensitive. Its focus has always been more on cost-effective products than on actual cost differentiation. This has resulted in a polarised customer base for sustainable products.

However, with the recent government policies on plastic usage and a growing push for industries to adopt a low-waste policy, businesses in India have been increasingly moving towards a sustainable value chain.

Table 6: Opportunity potential assessment of innovative fibre-based packaging in India

Company	Public Commitments and Targets
Market segments of Interest	The market sub-segments—of innovative fibre-based packaging solutions—identified to have the highest business potential for Finnish companies are: ○ Bamboo-based packaging ○ Cellophane/cellulose-based packaging Figure 7 on the following page, highlights the summary of the opportunity potential of each target segment.

Company	Public Commitments and Targets
Intensity of Market Competition	The Indian packaging market based on innovative fibre-based materials is at a nascent stage. On account of being a niche industry, only a few players offer solutions at a large scale. Also, the technology development process and ecosystem in India, with respect to fibre-based materials, is often slow-paced leading to a slow cycle of innovations. Horizon Packs Pvt. Ltd. is one of the largest manufacturers of corrugated and solid fibre boxes in India. The company has already established a notable presence in the country by setting up 11 product plants throughout different regions. Many multinational companies, including Nestlé, Unilever, Colgate, Samsung and PepsiCo, use packaging solutions provided by Horizon Packs. A number of multinational packaging players such as WestRock (USA) and International Paper (USA) have already established their presence in India. Their target industries include food and beverages, e-commerce, HORECA among others.
Demand Drivers	Triggered by the rising expenditure levels of a growing middle-income group, end-user industries of packaging have undergone a huge upheaval. With the onset of the covid-19 pandemic, the country's supply chain underwent a paradigm shift with e-commerce penetrating tier-2 and tier-3 cities. Clubbed with the government's policy directives on reducing single-use plastic and an impetus on corporate social responsibility focusing on environmental issues, businesses in India are moving towards adopting sustainable solutions. Increasing demand from the retail sector has led to the growth in demand for sustainable packaging. According to RBI, for example, India recorded 93% of pre-covid sales in February 2021 alone. Furthermore, India witnessed a 15% increase in sales in consumer durables and an 18% increase in sales of quick service restaurants.
Market Gaps	India's innovative fibre-based packaging market is still in a budding stage in technology and process innovations when compared with the more mature markets such as Europe and the United States. Technology gap is one of the serious problems that are impeding growth in the segment.
Finnish Business Proposition	Finland is home to many breakthrough innovations in fibre-based sustainable packaging solutions based on wood-based raw materials. Finnish products, ranging from microscopic nanocellulose to advanced wood-based biopolymers and biochemicals, can be a good fit in the Indian sustainable packaging value chain.
Market Risks and Challenges	India's value chain for innovative fibre-based packaging is at a developing stage. This is mostly due to the supply side bottlenecks triggered by highly unorganised and fragmented supply nodes of bio-based materials in India. Moreover, eco-friendly packaging (based on bio-materials) is considered a premium segment by many industry players and customers. This, coupled with regulatory issues such as a moderately high import tariff (of ~32%) on most packaging materials, acts as a deterrent for companies who are looking to enter the market through exports. High-growth and high-opportunity sectors in India, such as e-commerce and packaged food, are extremely cost-competitive (except premium segments) and do not import packaging materials due to possible inflated prices caused by ocean freight and customs duty. Paper mills in India are also highly

Company	Public Commitments and Targets
	competitive and slight fluctuations in prices of input materials such as coal (for paper mills with captive power plants) affect their business.

Figure 8: High-potential sub-segments for Finnish companies in Innovative Fibre-based Packaging

Opportunity rating for Finnish companies	Strong points for Finnish companies	Weak points for Finnish companies
Bamboo-based packaging **Moderately High (6.20/10)**	❖ Strong Finnish competitive advantage ❖ Positive government policy outlook ❖ Relatively low market competition	❖ A lower level of value chain maturity ❖ Demand outlook for mass-marketed sustainable products is low
Cellophane/cellulose packaging **High (7/10)**	❖ Positive government policy outlook ❖ Relatively low market competition ❖ Moderately good cost competency	❖ A lower level of value chain maturity ❖ Demand outlook for mass-marketed sustainable products is low

Source: T&A Analysis

Figure 9: Summary outlook of Finnish opportunities in innovative fibre-based packaging solutions

Summary outlook of Finnish opportunities in innovative fibre-based packaging solutions

Demand Outlook

- Expanding nature of retail, HORECA, food delivery, and e-commerce driving the growth of this segment.
- Growing awareness about sustainability among consumers.
- New rules banning single-use plastics.

Market Competition

- Indian market is at a developing stage.
- Advance bio-based materials are a niche segment.
- SMEs and start-ups are dominant players in the value chain.
- Cost implications of required technologies are the primary deterrent to the development of domestic large-scale production.

Finnish Proposition

- Lignocellulosic materials
- Materials out of fractionation of biomass
- Advanced materials from cellophane/cellulose
- Wood-based biopolymers and biochemicals
- Other advanced bio-based materials

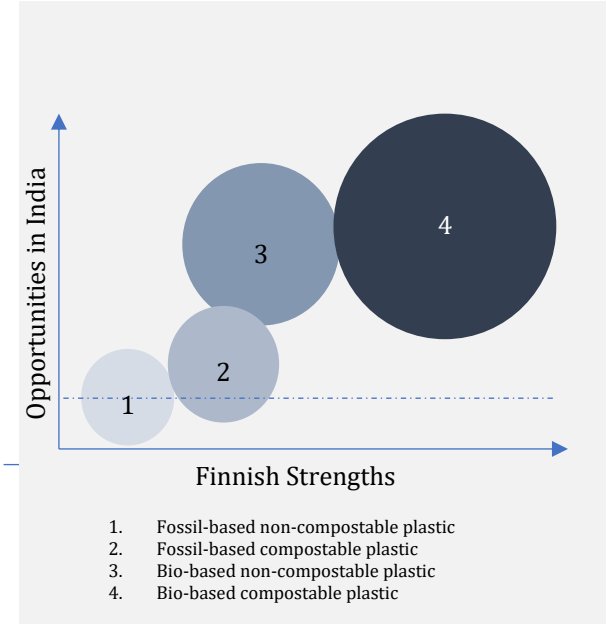
6.2. Plastic-based Sustainable Packaging

According to the Packaging Industry Association of India, the Indian packaging industry is growing at a CAGR of 27% for the period of 2021-2026. Flexible plastic packaging accounts for 70% of the Indian packaging market share.

Initial state laws banning single-use plastics, along with growing awareness among consumers, have been the primary drivers for the adoption of bio-based plastics in India. Leading end-user segments include FMCG, food delivery, food and beverages, pharmaceutical among others.

In India, two types of bio-based plastics have a presence in the market—bio-degradable/compostable bio-based plastics and non-biodegradable/compostable bio-based plastics. PLA continues to be the most accepted product owing to its recyclable, bio-degradable and compostable nature.

As a move towards sustainability and reduction in single-use plastics, most companies adopted bio-based plastics as a go-to solution. The relative cost-effective nature of this segment attributes to its wide acceptance.



Source: T&A Analysis

Table 7: Opportunity assessment mapping of plastic-based sustainable packaging in India

Company	Public Commitments and Targets
Market segments of Interest	Among the plastic-based packaging solutions, bio-based compostable plastic packaging (PLA, PHA, PBS etc.), bio-based non-compostable plastic packaging (Bio-PET, Bio-PE etc.), and fossil-based compostable plastic packaging solutions (PBAT, PCL, etc.) are expected to have robust opportunities in India. The market sub-segments of plastic-based sustainable packaging identified to have the highest business potential for Finnish companies are: ❖ Bio-based non-compostable plastic ❖ Bio-based compostable plastic Figure 10, on the following page, highlights the summary of the opportunity potential of each target segment.
Intensity of Market Competition	The Indian market for sustainable plastic-based packaging is dominated by start-ups and SMEs. For example, Tgp Bioplastics Pvt. Ltd., an Indian start-up, offers bio-degradable plastic solutions like carrying bags, parcel packaging etc. After realising the vast scope for growth in India, Finland's packaging giant Huhtamaki has acquired several packaging start-ups in India to help the company meet customer and industry demands in the segment. Major India companies in India:

Company	Public Commitments and Targets
	❖ Ecolife ❖ EnviGreen Biotech Pvt. Ltd. ❖ Tgp Bioplastics Pvt. Ltd Major international companies in Idnia: ❖ Amcor PLC (Switzerland) ❖ CCL Industries Inc. (Canada) ❖ Mondi Group (UK) Major Finnish companies in India: ❖ Huhtamaki Oyj ❖ Stora Enso Oyj ❖ UPM Raflatac
Demand Drivers	India is one of the largest producers of plastic waste in the world. But a growing awareness in the country, especially among Gen-Z and millennials, clubbed with government initiatives and regulations to curb the use of plastic, are driving the adoption of sustainable substitutes in plastic packaging across various sectors. E-commerce and the food delivery sector have been at the forefront of this change in India. The rising expenditure levels of the growing middle-income group have provided a fillip to the adoption of relatively higher-cost components in the packaging value chain. With the onset of the covid-19 pandemic, the country's supply chain underwent a paradigm shift with e-commerce penetrating tier-2 and tier-3 cities. Clubbed with the government's policy directives on reducing single-use plastic and an impetus on corporate social responsibility focusing on environmental issues, businesses in India are moving towards adopting sustainable solutions.
Market Gaps	While this segment is dominated by SMEs, the nascent stage of technology and difficulty in meeting cost compliance needs have made it difficult for businesses to reach large-scale production. Furthermore, high investment requirements, cost of operations, inadequate space, and lack of skilled labour are a few of the other reasons impeding the innovation, development and testing of new materials and technology in India.
Finnish Business Proposition	With a wide range of plastic alternatives in bio-based and fossil-based packaging segments, Finnish companies can leverage the developing Indian sustainable packaging market. The product offerings have the potential to replace plastic in food packaging, cosmetics & personal care, cushioning of fragile products and labelling.
Market Risks and Challenges	Price is among one of the key challenges in the segment. Unlike plastic packaging, which enjoys a highly matured market, the market for plastic packaging substitutes is relatively new and at a growing stage. There is reluctance in completely adopting the substitutes, mainly due to the higher cost. So far, the front runners in adopting sustainable solution have fulfilled their demand through domestic channels.

Figure 11: High-potential sub-segments for Finnish companies in Plastic-based Sustainable Packaging

Opportunity rating for Finnish companies	Strong points for Finnish companies	Weak points for Finnish companies
Bio-based compostable plastic  **High (8.20/10)**	❖ Strong Finnish competitive advantage ❖ Positive government policy outlook ❖ Relatively low market competition	❖ Low level of value chain maturity ❖ Plastic polymers of Indian companies are highly cost-competitive
Bio-based non compostable plastic  **High (7.7/10)**	❖ Positive government policy outlook ❖ Relatively low market competition ❖ Strong demand outlook ❖ Moderately good cost competency	❖ Low level of value chain maturity ❖ Plastic polymers of Indian companies are highly cost-competitive

Source: T&A Analysis

Figure 12: Summary outlook of Finnish opportunities in plastic packaging solutions

Summary outlook of Finnish opportunities in plastic packaging solutions

Demand Outlook

- Government regulation to ban single-use plastics and to increase plastic thickness from 50 to 120 microns.
- Growth of e-commerce sector.
- Gen-Z and millennials' inclination towards sustainability.
- Strong growth in branded retail, HORECA and food delivery platforms.

Market Competition

- The market is at an infant stage along with a nascent level of technologies.
- Low to Moderate competition as plastic alternatives is still a niche segment.

Finnish Proposition

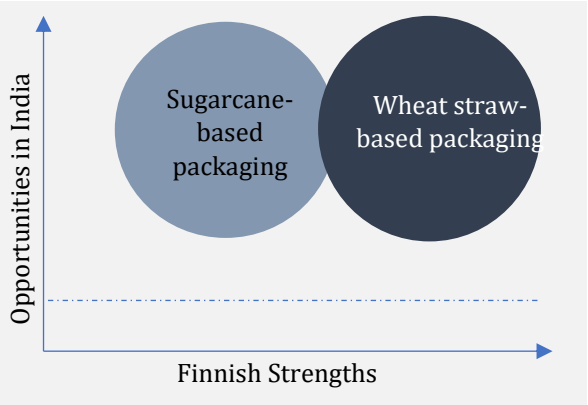
- Advanced materials from cellophane/cellulose
- Bio-based foam
- Fluorochemical-free fibres
- Wood-based biopolymers and biochemicals

6.3. Eco-waste-based Packaging

Eco-waste-based sustainable packaging is a niche segment in India's upcoming sustainable packaging market and is at a developing stage. Currently, sugarcane waste, wheat straw, and corn starch are the commonly used material.

SMEs and start-ups dominate the eco-waste-based sustainable packaging market in India. For example, Ecoware Solutions Pvt. Ltd. is a well-known name in the sustainable packaging value chain of India. The home-grown company offers packaging made from sugarcane and wheat as an alternative to plastic. Their products are not only made with virgin food-grade material but are also 100% compostable and recyclable.

Figure 13: Opportunity map for Finnish companies in eco-waste-based sustainable packaging solutions in India



Source: T&A Analysis

F&B, e-commerce, and FMCG industries in India have been the primary adopters of eco-waste-based packaging solutions.

Table 8: Opportunity potential assessment of eco-based sustainable packaging in India

Company	Public Commitments and Targets
Market segments of Interest	The highest business potential are: Sugarcane-based packaging material Wheat straw-based packaging material Figure 12 below, highlights the summary of the opportunity potential of each target segment.
Intensity of Market Competition	The market is currently at an early stage of development. The competition includes India-based start-ups such as Ecoware. India's eco-waste-based packaging solutions market is marked by start-ups with operations and supply chains catering to regional needs. Many zero-waste start-ups have entered the sustainable packaging value chain with similar product offerings. One popular name is Bengaluru-based Nandu's. The growth of technology and innovation processes in eco-waste-based materials is slow due to the high cost of technology and raw material processing. Major India companies in India: ❖ Pappco Greenware ❖ Ecoware ❖ Bambrew ❖ Nandu's Major international companies in India: ❖ BIO-LUTIONS International AG (Germany) ❖ Mondi Group (UK) Major Finnish companies in India: ❖ Metsä Group ❖ Stora Enso Oyj

Company	Public Commitments and Targets
	❖ UPM Raflatac
Demand Drivers	A burgeoning market for packaging has been the primary demand driver for the adoption of eco-based-waste material for packaging solutions. According to industry reports, the e-commerce segment of the packaging market was estimated at ~USD 450 million in 2019. It is forecasted to reach ~USD 975 million by 2025. Following the Indian government's directives banning single-use plastic, there is pressure on Indian businesses to adopt sustainable measures. The rising expenditure levels of the growing middle-income group have been given a boost to the adoption of relatively higher cost components in the packaging value chain.
Market Gaps	Lack of proper segregation of solid waste and low awareness levels among the agriculture & other eco-waste generating sectors has made it difficult for key stakeholders to source raw material. The lack of segregation has been a deterrent for start-ups in engaging in the large-scale production of eco-waste-based solutions. In this scenario, companies need to invest in technology and machines that have a high-cost differential in comparison to their plastic counterparts. The limited geographical expanse of the SMEs operating in the segment is a testament to the existing gaps. Therefore, difficulty in sourcing raw material along with the lack of adequate infrastructure to test and innovate new packaging materials has been impeding the growth further.
Finnish Business Proposition	Finnish expertise in eco-waste-based packaging solutions ranges from packaging material from tall-oil, turpentine and biomass to side streams of sawmilling. Finnish businesses can leverage the market in India supported by demand outlook to market their products in the new and developing market in India.
Market Risks and Challenges	Unlike plastic-based packaging, which is cheap, eco-waste-based packaging is relatively expensive. The price sensitivity of the market in India is among the key factors keeping this segment from reaching its full potential. For most consumer companies, the packaging cost stands between 8-12% of the cost of goods sold (COGS). For luxury brands, the cost of packaging ranges between 8-15%. Sustainable models have costs of packaging going up by about 20-25%, depending upon the segment. The underdeveloped value chain and the slow adoption rate (due to price or usability) could pose a challenge in market penetration.

Source: T&A Analysis

Figure 14 High-potential sub-segments for Finnish companies in eco-waste-based

	Opportunity rating for Finnish companies	Strong points for Finnish companies	Weak points for Finnish companies
Sugarcane-based packaging solutions	**Moderately High (6.10/10)**	❖ Positive government policy outlook ❖ Strong demand outlook ❖ Relatively low market competition	❖ Low level of value chain maturity ❖ Price competency vis-à-vis Indian players
Wheat straw-based packaging solutions	**Moderately High (6.10/10)**	❖ Positive Government policy outlook ❖ Strong Demand outlook ❖ Relatively low market competition	❖ Low level of value chain maturity ❖ Price competency vis-à-vis Indian players

Source: T&A Analysis

Figure 15: Summary outlook of Finnish opportunities in eco-waste-based packaging solutions

Demand Outlook

- Government regulation to ban single-use plastics and to increase plastic thickness from 50 to 120 microns.
- Growth of e-commerce sector.
- Gen-z and Millennial's inclination towards sustainability.
- Strong growth in branded retail, HORECA and food delivery platforms.

Market Competition

- The market is at a young and developing stage.
- With only a few companies in the market, the intensity of market competition lies in the low to moderate zone.

Finnish Propositions

- Packaging technologies based on sugarcane waste
- Innovative technologies based on Soy molasses
- Wood pulp-based advanced biomaterials
- Other side streams-based materials

6.4. Paper-based packaging

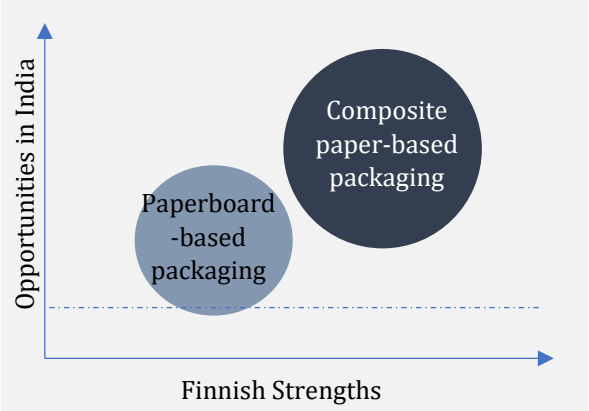
Paper and cardboard account for 20% of the market share of the Indian packaging industry. This is indicative of an existing market for innovations and technologies to explore.

Primary end-users of this particular segment include FMCG goods, e-commerce, Food & Beverage industry, food delivery sector, pharmaceuticals, industrial packaging among others.

The market for paper-based packaging solutions is an amalgamation of domestic and international players.

Cost-effective solutions in paper have made it easier for companies to scale up their production in the Indian market. Pre-existing technologies to support manufacturing has been one of the primary reasons for the successful development of this segment.

Figure 16: Opportunity map for Finnish companies in paper-based sustainable packaging solutions in India



Source: T&A Analysis

Table 9: Opportunity potential assessment of paper-based sustainable packaging in India

Company	Public Commitments and Targets
Market segments of Interest	Major sub-segments in India under paper-based packaging are kraft paper-based packaging, cardboard-based packaging, paperboard-based packaging and composite paper-based packaging. However, the highest business potential for Finnish companies are in the following: ❖ Paperboard based packaging ❖ Composite paper-based packaging Figure 15 below, highlights the summary of the opportunity potential of each target segment.
Intensity of Market Competition	Indian paper-based packaging segment is moderately developed. However, the product base is primarily limited to conventional corrugated cartons. Penetration of technological innovations among these segments is relatively slow in India. The key players include and amalgamation of Indian brands, international players, and a large share of unorganized SMEs. Major India companies in India: ❖ Horizon Packs ❖ UFlex Limited ❖ Boxify Shanti Packaging Industries ❖ Packmile Major international companies in India: ❖ Westrock (USA) ❖ International Paper (USA) ❖ Mondi Group (UK)

Company	Public Commitments and Targets
	Major Finnish companies in India: ❖ Huhtamaki ❖ Stora Enso ❖ Metsä Group
Demand Drivers	Expansion of the Indian e-commerce market has been the primary growth driver for paper-based packaging material in India. The Indian e-commerce market is expected to reach ~USD 200 billion by 2025. This is indicative of the growth in demand for packaging material. Propelled by growth and increasing geographical coverage, e-commerce businesses in India have been pushed towards partnering with more than one company in the packaging sector. For example, Indian e-commerce leaders like Amazon India follow a multi-vendor policy, which means multiple vendors are needed to fulfill the requirements of the entire chain. The company selects suitable vendors based on numerous factors such as the geographical location of the Amazon facility and the supplier's location. Further push from the government towards sustainable packaging has driven companies to adopt more sustainable measures. 
Market Gaps	While the Indian paper-based packaging value chain has a number of large players, the segment is dominated by SMEs and is unorganised. This has kept the segment from reaching its growth potential. End-user segments are compelled to rely on the available SMEs—functioning at a lower scale of innovation—in certain geographies where large-scale players do not have a presence. As a result, customers have been on the receiving end of damaged goods. As per a recent survey by Amazon, about a quarter of the respondents stated that they have received a defective product due to poor packaging. Such findings suggest scope for improvement in existing paper-based packaging applications marketed in India. Even with the rapid growth in the Indian e-commerce space, the overall share of e-commerce sales in total retail sales is still relatively low. This is mostly because only certain categories such as electronics, apparel and books have a higher penetration

Company	Public Commitments and Targets
	in e-retailing due to lack of supportive packaging technology. This indicates the growing potential for Finnish companies in the Indian e-commerce sector.
Finnish Business Proposition	Finnish paper-based packaging applications, with the help of technologies such as advanced graphic printing, can cater to the rising needs of the dynamic Indian market. Finnish companies offer numerous proprietary technologies in innovative paper-based packaging. Such technologies range from solutions such as barrier coatings, high-quality saturating base kraft papers to reinforcement solutions for cardboard boxes etc. Finnish packaging portfolio includes paper boards made out of tailor-made wood pulps which provide high-converting performance and enhanced visual properties to the package. Other innovative products include paperboard-based liquid bottles, which have the potential to capitalize on many niche segments in the Indian packaging space. **Jospak Oy's innovative gastight board-based trays** ❖ Product range: Finnish start-up Jospak has created a board-based tray packaging that contains up to 85% less plastic than a regular plastic alternative. ❖ Material and technology used: The Jospak tray consists of a board-based tray and a separate multi-layer barrier film. The tray is hermetically sealed with lidding film, which makes the tray suitable for modified atmosphere packaging (MAP). It is compatible with the existing automatic packaging process in the food industry. After use, the consumer can peel away the inner film liner and dispose of the materials in the dedicated waste streams or recycle. ❖ Target customer segments: Food & Beverages industry (suitable for diverse food products which are currently packed in plastic)
Market Risks and Challenges	On account of being dominated by unorganized players in certain geographies, cost-compliance of imported or high-quality products can be a major challenge for businesses wishing to enter the Indian market. With the former offering products at a lower price, innovative products might find it challenging to compete with the price levels. Another possible challenge in the Indian paper-based packaging segment is the over-dependency of paper mills on coal. Indian paper mills with captive power plants consume about 1 tonne of coal to produce 1 tonne of paper. This makes the companies extremely vulnerable to fluctuation in coal prices.

Figure 17: High-potential sub-segments for Finnish companies in Paper-Based Packaging

	Opportunity rating for Finnish companies	Strong points for Finnish companies	Weak points for Finnish companies
Composite paper-based packaging	**Moderately High (6.9/10)**	❖ Strong potential for market capitalization ❖ Strong Finnish competitive advantage ❖ Positive demand outlook	❖ Low level of value chain maturity ❖ Demand outlook for mass-marketed products is low
Paperboard-based packaging	**Moderately High (5.80/10)**	❖ Strong demand outlook ❖ Mature value chain	❖ Low expected cost competency for Finnish companies ❖ High intensity of market competition

Source: T&A Analysis

Figure 18: Summary outlook of Finnish opportunities in paper packaging solutions

Summary outlook of Finnish opportunities in paper packaging solutions

Demand Outlook

- One of the biggest and fast-growing e-commerce space in the world.
- Demographic factors such as the growing middle-class income.
- Growing corporate sustainability initiatives.

Market Competition

- Only a handful of companies in India offer innovative paper-based packaging.
- Unorganized and SMEs dominate supply to e-commerce players in India.

Finnish Propositions

- High-quality saturating base kraft paper technology.
- Barrier coatings suitable for paper and board for food applications.
- Water-based dispersion coated barrier board.

7. Opportunity Potential in Targeted Industries

It has been established, in the earlier sections, that the target end-user segments for sustainable packaging are FMCG, Food & Beverages, E-commerce, and Pharmaceuticals. In this section, each table focuses on establishing a correlation between the current nature of packaging industry in each target industry with the available Finnish innovations in the market.

7.1. Fast Moving Consumer Goods (FMCG)

Figure 19: Major applications of Finnish innovations in FMCG

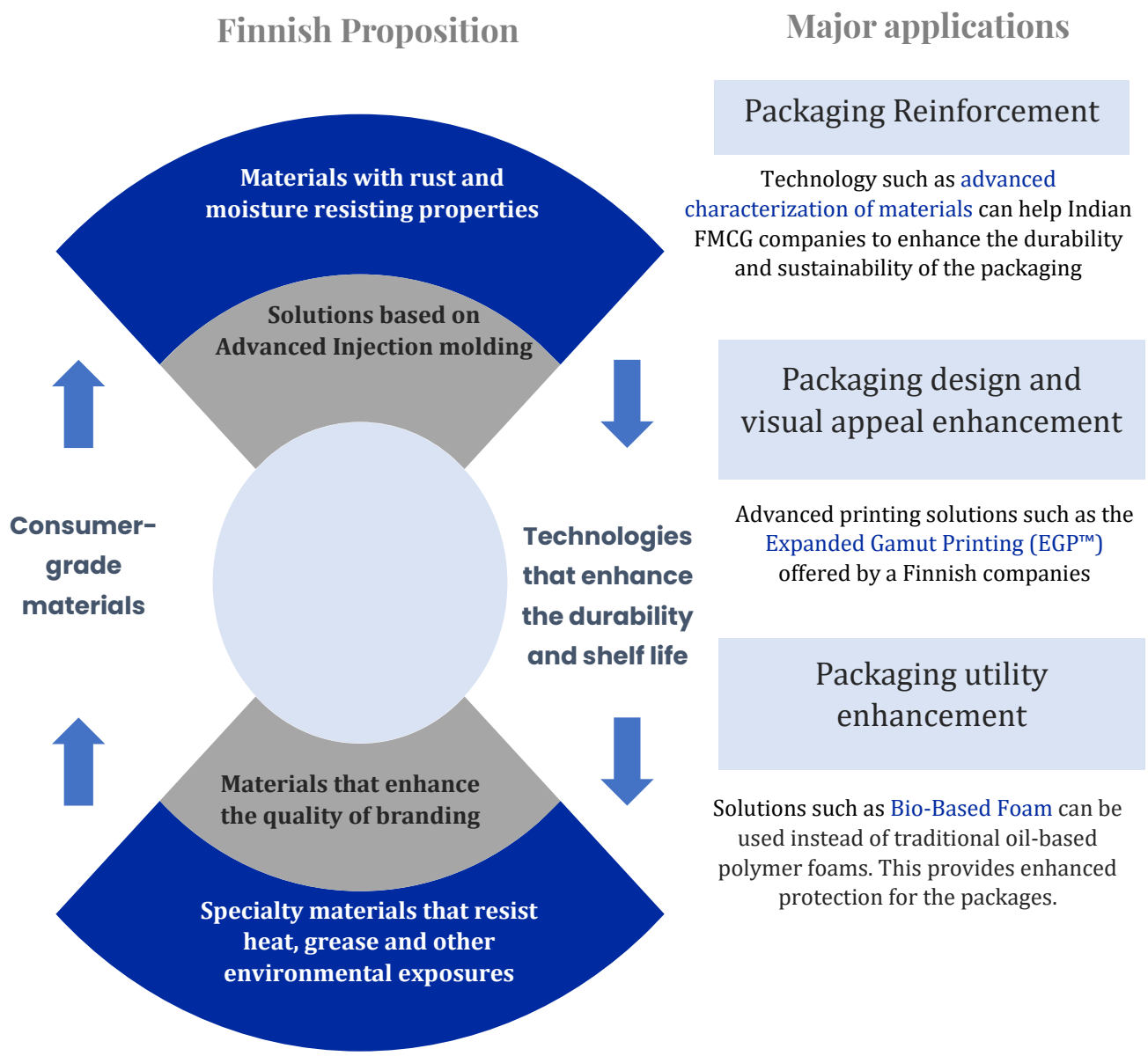


Table 10: Finnish business propositions for FMCG industry in India

Evaluation Criteria	Opportunity Potential: High
Market Size and Growth	The FMCG industry is the 4th largest sector in Indian economy. In 2020, the market was worth ~USD 110 billion[26]. With a CAGR of ~15%, the market is expected to double by 2025[26]. Top FMCG companies in India are Dabur, Colgate, and Hindustan Unilever. Urban areas accounts for ~60% of total FMCG consumption revenue in India but semi-urban and rural areas are witnessing higher growth rate in FMCG sector[26].
Role of Packaging	For FMCG products, two aspects—marketing and durability of the product—drive the packaging industry. First, packaging is utilized as a method for marketing and brand building. Second, packaging is utilized to physically protect the goods from damage due temperature changes, pollution, and contamination, and prevent the loss of nutritional value such as denaturing of proteins, oxidation of fats amongst others. Also, packaging and labelling is an important part of FMCG goods. Each FMCG product should abide by the government directives and give all required information on their packaging. Due to the rising popularity of convenient sizing of products, sizing of the packaging has become an important aspect.
Currently used Packaging Material	Plastic and paper are the dominant packaging material used in the Indian FMCG industry. Other materials like glass and metal. Product portfolio of this industry segment include: ❖ Mono cartons ❖ Litho laminated cartons ❖ Window cartons ❖ Transformer pouches ❖ Zip lock pouches ❖ Flat bottom plastic pouches ❖ Doypacks ❖ Dual compartment pouches ❖ Bottles ❖ Sachets amongst others
Sustainable Packaging Scenario in India	The sustainable packaging technology adopted by this segment are: ❖ Non-compostable bioplastics, ❖ Compostable bioplastics ❖ 100% recyclable plastic ❖ Recycled plastic ❖ Kraft paper ❖ Paperboards ❖ Recycled paper ❖ Paper derived from agricultural waste

[26] Invest India, Government of India

Evaluation Criteria	Opportunity Potential: High
Existing Market Gaps	❖ Sustainable printing for packaging i.e., packaging printers, designers, technologies that can be adopted into the current plastic-based processing systems, and nanoimprinting ❖ Biobased glues and tapes used for reinforcement ❖ Paper-bag in box designs for liquid
Indian Companies Supplying to the Indian Value Chain	Indian companies comprise mostly of start-ups and SMEs: ❖ Ecoware ❖ Bambrew ❖ Craste ❖ Schmancy ❖ Eviocor ❖ Innovative Pulp Products ❖ Pulp2Pack ❖ Earthware

7.2. Food & Beverages

Figure 20 20: Major applications of Finnish innovative packaging in Food & Beverages in India

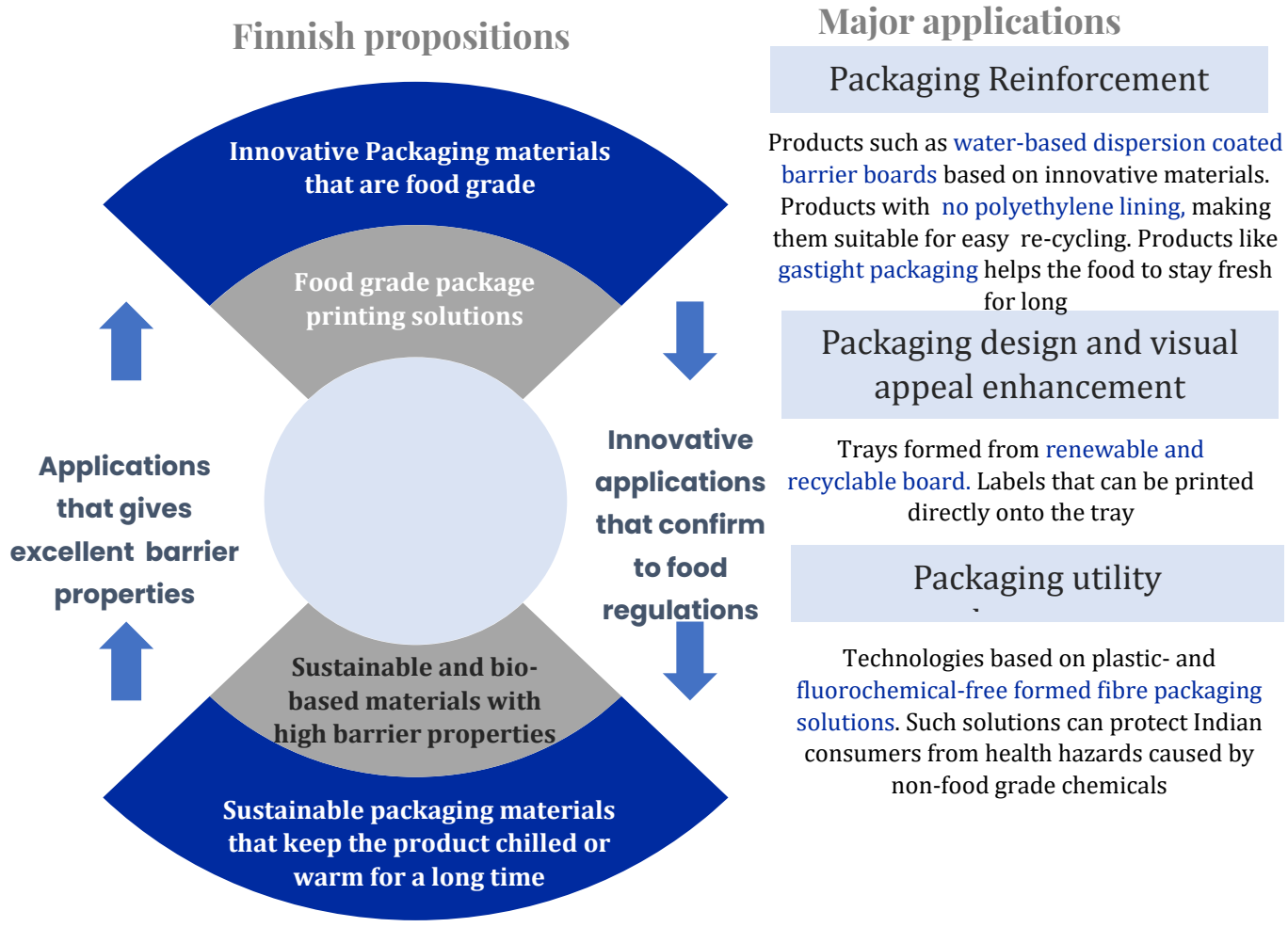


Table 11: Opportunity potential for Food & Beverages industry in India

Evaluation Criteria	Opportunity Potential: High
Market Size and Growth	The Food & Beverages packaging industry was valued at ~USD 33 billion in 2020.[27] Growing at a CAGR of 30%, the segment is expected to reach ~USD 160 billion by 2026[27]. The food and beverages industry accounts for ~3% of India's GDP.[28] The industry was valued at ~USD 53 billion in 2019[27]. It is expected to grow at a CAGR of 16% and reach ~USD 130 billion by 2026[27]. The 'in-kitchen' segment—comprising of staples, spices, and condiments, dairy, and others—account for ~70% of the Food & Beverages market[27]. This is followed by 'on-the-table' (20%) and 'on-the-go' (10%) segments[27].
Role of Packaging	❖ Avoid contamination and damage: The prime application of packaging in Food and Beverages industry is to ensure safety and security. Packaging ensures that the products are free of contamination, moisture absorption, and damage at all points in the retail process. ❖ Display of crucial information: Government directives in India requires all food products display a list of the ingredients used in their products, as well as the accompanying nutritional facts. ❖ Promotes in-store packaging: Product packaging is one of the key elements to capture the consumer's attention. Food products with eye-catching packaging are much more likely to be purchased over competitors with a more generic design
Currently used Packaging Material	Various types of aseptic packaging have been developed over the years as a result of different demands. Plastic, bioplastics, and paper account for a major share of the packaging material used in the industry. Other commonly used material includes glass and metal. Product portfolio of this industry segment include: ❖ Mono cartons ❖ Litho laminated cartons ❖ Window cartons ❖ Transformer pouches ❖ Zip lock pouches ❖ Flat bottom plastic pouches ❖ Doypacks ❖ Dual compartment pouches ❖ Bottles ❖ Sachets amongst others ❖ Cans ❖ Jars ❖ PET ❖ Bag in box ❖ Form-fill-seal packaging
Sustainable Packaging Scenario in India	The sustainable packaging technology adopted by this segment are: ❖ Non-compostable bioplastics, ❖ Compostable bioplastics ❖ 100% recyclable plastic ❖ Recycled plastic ❖ Kraft paper

[27] Industry reports and press research
[28] Future Of Indian Food and Beverage Industry Post-Pandemic, Indian Brand Equity Foundation, December 2020

Evaluation Criteria	Opportunity Potential: High
	❖ Paperboards ❖ Recycled paper ❖ Paper derived from agricultural waste
Market Gaps	❖ Sustainable printing for packaging i.e., packaging printers, designers, technologies that can be adopted into the current plastic-based processing systems, and nanoimprinting ❖ Biobased glues and tapes used for reinforcement ❖ Paper-bag in box designs for liquid ❖ Blow and eco-moldings systems ❖ Technologies compatible with current plastic packaging processing systems
Indian Companies Supplying to the Indian Value Chain	Indian companies comprise mostly of start-ups and SMEs: ❖ Ecoware ❖ Bambrew ❖ Craste ❖ Schmancy ❖ Eviocor ❖ Innovative Pulp Products ❖ Pulp2Pack ❖ Earthware

7.3. Food Delivery sector

Figure 21 21: Major applications of Finnish innovative packaging in Food Delivery sector

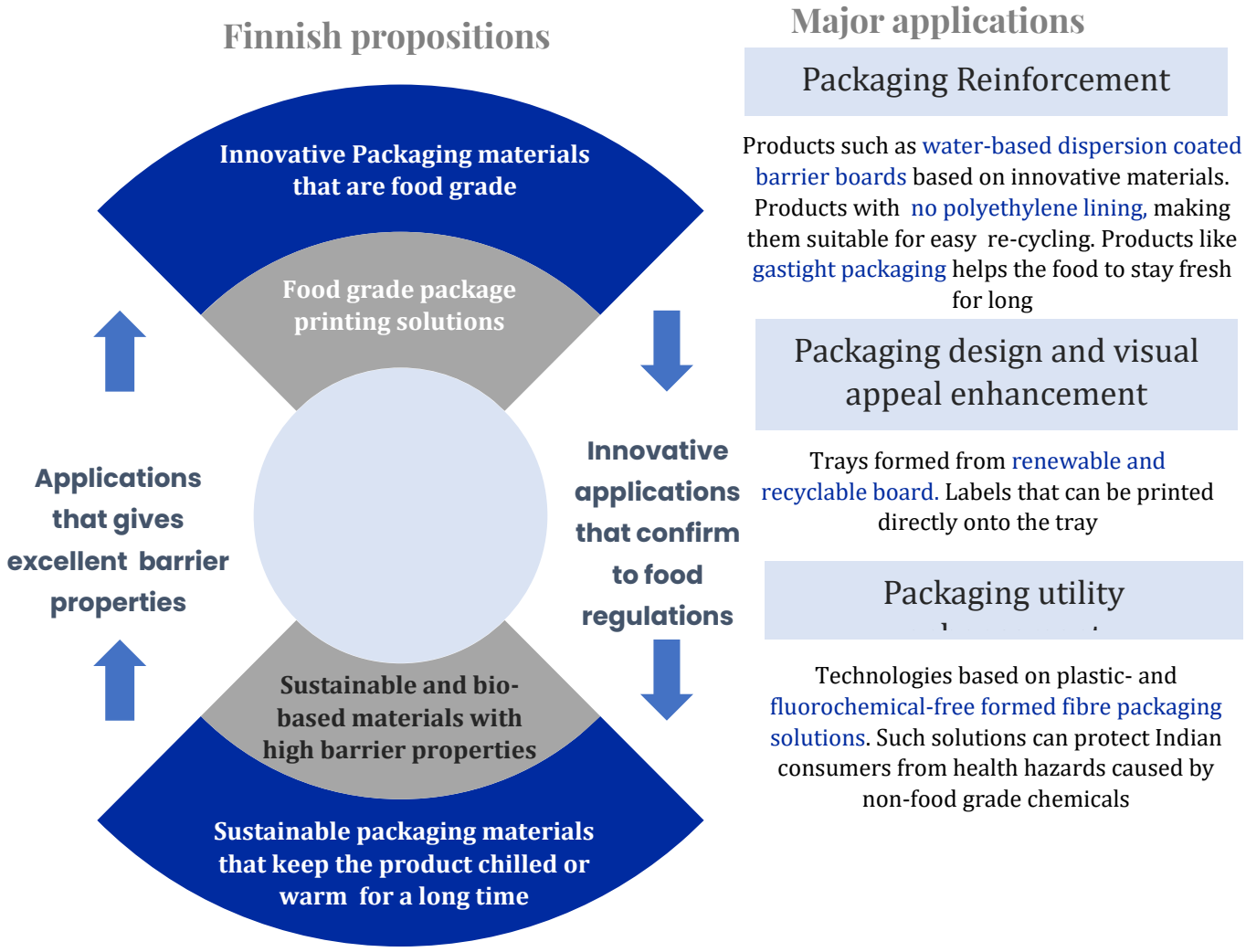


Table 12: Opportunity potential in Food delivery sector in India

Evaluation Criteria	Opportunity Potential: High
Market Size and Growth	The food delivery market was estimated worth ~USD 4 billion in 2020. Between 2021-2026, the market is expected to grow at a CAGR of ~30%[29]. The market growth is supported by increasing disposable income, use of smartphones and expansion of internet services across India and all income groups. Urban cities accounts for ~70% of the total online food delivery service[30]. Though tier 2 and 3 areas have a small share, but are growing, especially after the recent pandemic.

[29] Press research
[30] GLG

Evaluation Criteria	Opportunity Potential: High
Role of Packaging	An important part of the food delivery sector is packaging. The main purpose of packaging is to protect the food from leakage, spoilage and to ensure quality while delivered at doorstep. The quality of packaging has become an important way to communicate the brand value and build brand name. Nowadays, food delivery companies are also using packaging as a tool to differentiate their product from competitors via attractive and innovative designs.
Currently used Packaging Material	Plastic, bioplastics, and paper account for a major share of the packaging material used in the industry. Currently, the packaging material used in this section are: ❖ Mono cartons ❖ Laminated cartons ❖ Pouches ❖ Zip lock pouches ❖ Flat bottom plastic pouches ❖ Bottles ❖ Sachets amongst others ❖ Cans ❖ Cups ❖ Jars ❖ Containers ❖ Trays ❖ Carry Bags
Sustainable Packaging Scenario in India	The sustainable packaging technology adopted by this segment are: ❖ Non-compostable bioplastics, ❖ Compostable bioplastics ❖ 100% recyclable plastic ❖ Recycled plastic ❖ Kraft paper ❖ Paperboards ❖ Recycled paper ❖ Paper derived from agricultural waste
Market Gaps	❖ Sustainable printing for packaging i.e. packaging printers, designers, technologies that can be adopted into the current plastic-based processing systems, and nanoimprinting ❖ Biobased glues and tapes used for reinforcement ❖ Food safe consumer boards for durable food packaging ❖ Eco-based barrier coating and films for heat seal ability ❖ Sustainable packaging protecting moisture and grease transfer ❖ Paper-bag in box designs for liquid ❖ Technologies compatible with current plastic packaging processing systems
Indian Companies Supplying to the Indian Value Chain	Major demand for sustainable packaging of this sector is being fulfilled by either start-ups or SME enterprises. Some of them are as follows: ❖ Pappco ❖ Ecoware ❖ Dineearth ❖ Ecolife Paper Products ❖ Eviocor ❖ Greenergi

7.4. E-commerce

Figure 22 22: Major applications of Finnish innovative packaging in E-commerce in India

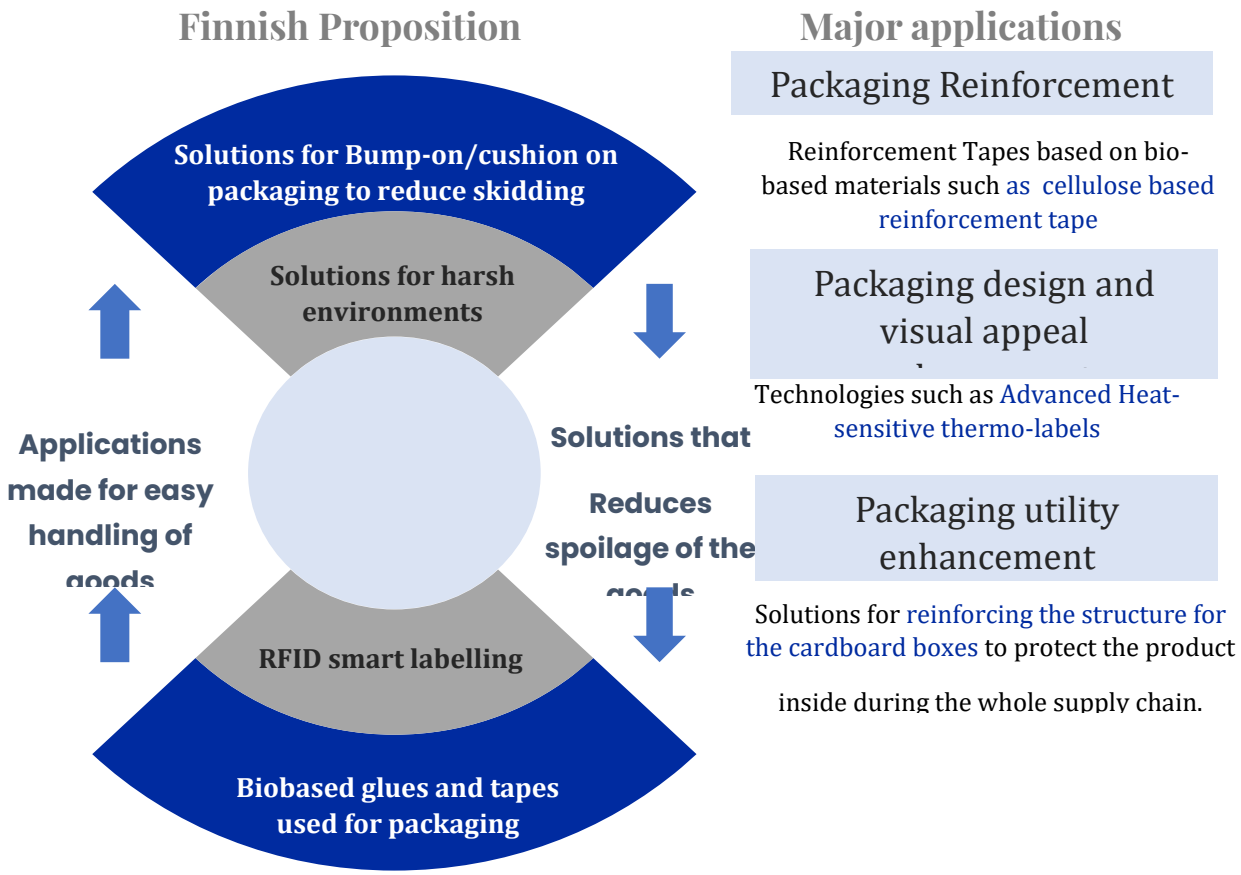


Table 13: Opportunity potential for E-commerce in India

Evaluation Criteria	Opportunity Potential: High
Market Size and Growth	The India E-commerce industry clocked ~USD 55 billion in sales, in 2021.[31] India is expected to become the third largest online retail market globally, after USA and China. The industry is expected to clock ~USD 350 billion in GMV by 2030[31]. Expansion of the e-commerce industry is primarily attributed to the increasing penetration of smartphones and internet usage across India. India is expected to have ~1 billion internet users, and 220 million online shoppers by 2025[32]
Role of Packaging	E-commerce has been one of the primary boosters of the increase in demand of packaging. This is because, a product cannot be shipped without appropriate packaging. The primary purpose of packaging in e-commerce is protection.

[31] Online retail set to see its biggest jump in 2021, Live Mint, July 2021
[32] E-commerce Market in India, Grant Thornton, April 2021

<table>
<tr><td>Evaluation Criteria</td><td>Opportunity Potential: High</td></tr>
<tr><td></td><td>The e-commerce logistics channel is more complex than the traditional retail channel. It involves products to be handled at different touchpoints such as fulfilment centres, logistic touchpoints amongst others.

Therefore, packaging is a necessary link in the supply chain that facilitates logistics efficiency.</td></tr>
<tr><td>Currently used Packaging Material</td><td>
<table>
<tr><th>Type of packaging used</th><th>Material used</th></tr>
<tr><td>Corrugated boxes</td><td>Kraft paper, Paperboard, Cardboards</td></tr>
<tr><td>Polybags</td><td>Plastic, Bioplastic-compostable and non-compostable, Paper pouches, Bamboo-based paper, Eco-waste based paper</td></tr>
<tr><td>Fillers</td><td>Bubble wraps, air pillows, wood chunks, paper pillows</td></tr>
</table>
</td></tr>
<tr><td>Sustainable Packaging Scenario in India</td><td>The sustainable packaging technology adopted by this segment are:
❖ Non-compostable bioplastics,
❖ Compostable bioplastics
❖ 100% recyclable plastic
❖ Recycled plastic
❖ Kraft paper
❖ Paperboards
❖ Recycled paper
❖ Paper derived from agricultural waste</td></tr>
<tr><td>Market Gaps</td><td>❖ Biobased glues and tapes
❖ Low weight carton boxes for transit packaging
❖ Biobased films for paper pouches
❖ Software for sustainable printing</td></tr>
<tr><td>Indian Companies Supplying to the Indian Value Chain</td><td>Some of the companies supplying sustainable packaging solutions to this sector are:
❖ Pappco
❖ Ecoware
❖ Dineearth
❖ Ecolife Paper Products
❖ Schmancy
❖ Eviocor
❖ Innovative Pulp Products
❖ Pulp2Pack
❖ Earthware</td></tr>
</table>

7.5. Pharmaceutical

Figure 23 23: Major applications of Finnish packaging innovations in Pharmaceuticals in India

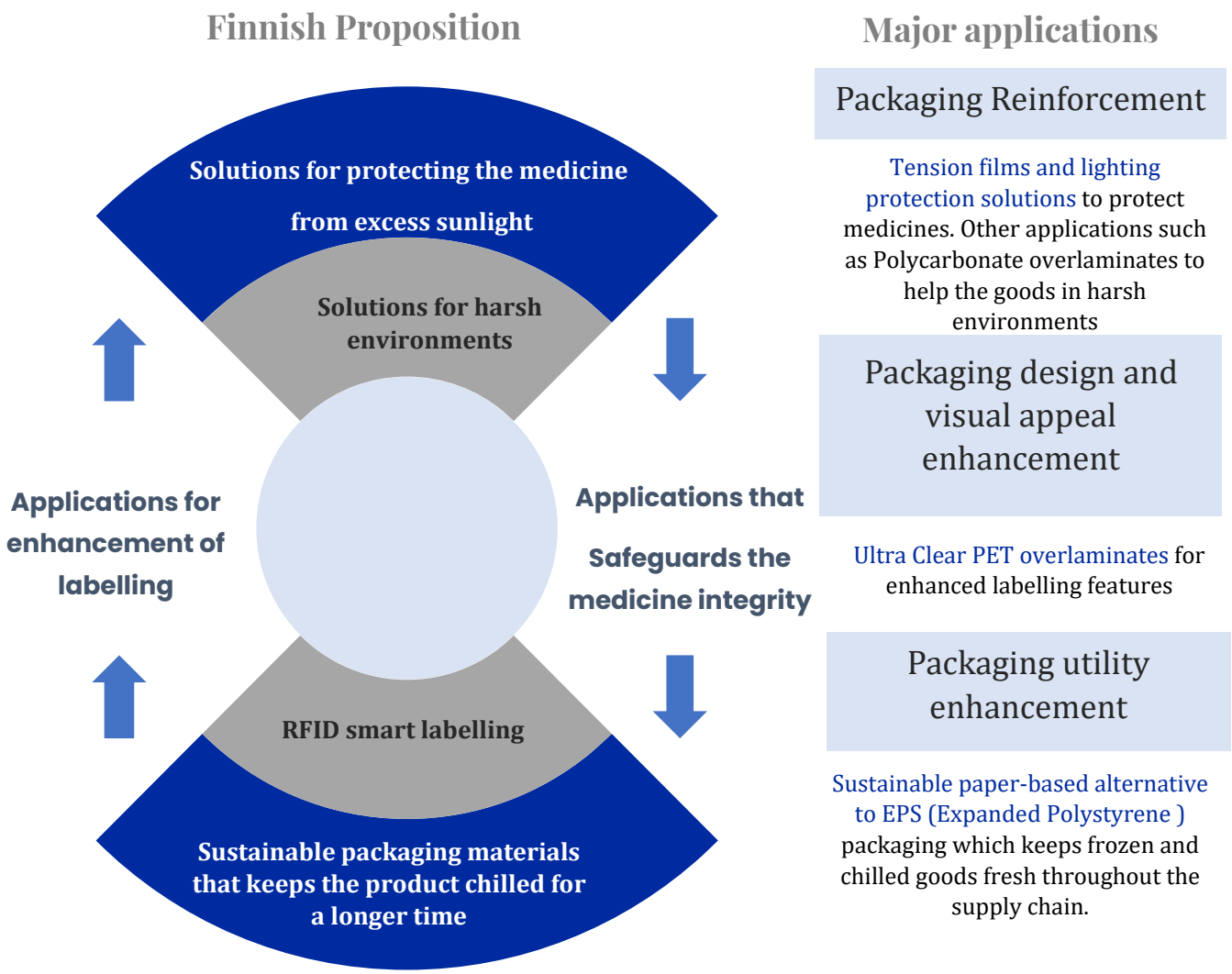


Table 14: Opportunity Potential for Pharmaceutical industry in India

Evaluation Criteria	Opportunity Potential: High
Market Size and Growth	India accounts for a notable share in the global pharmaceutical industry. As per volume share, India ranks 3rd globally in production and 14th as per value[33]. Indian pharmaceutical industry consists of ~60,000 generic brands. The market is expected to be worth ~USD 65 billion by 2024[34] and grow at a CAGR of ~37% between 2020-2025[35].

[33] Invest India
[34] Invest India
[35] IBEF

Evaluation Criteria	Opportunity Potential: High
Role of Packaging	Critical requirements for pharmaceutical products are protection from any form of physical and chemical damage. An ideal packaging for pharmaceutical products will be one which could provide stability, avoid leakage and spoilage, protection from sunlight and heat or cold. Other than protection, packaging also serves as a medium to convey the customers about important information like expiry date ingredients, drug fact table, dose, use, warning, and allergic reaction. With growing use of pharmaceutical products, packaging has a vital role in the industry.
Currently used Packaging Material	Plastic, Aluminum foil and glass bottles are the dominant packaging material used in the Indian pharmaceutical industry. Product portfolio of this industry segment include: ❖ Containers ❖ Aluminum foil ❖ Injectables/Vials ❖ Bottles ❖ Cartons ❖ Paper Board ❖ Lamitubes ❖ Paper ❖ PVC Based Combinations
Sustainable Packaging Scenario in India	Adoption of sustainable packaging in India is taking place at a slow pace due to the compliance issues, regulations, chemical protection etc. It is important to maintain the efficacy of the product which, as of now, is a challenge with the current sustainable packaging technology in India. Having said this, paper-based packaging material is being used in secondary and tertiary packaging and in some cases as lids in the Indian pharmaceutical industry.
Indian Companies Supplying to the Indian Value Chain	Indian companies comprise mostly of start-ups and SMEs: ❖ Green Packs ❖ Vihaa Print and Pack Pvt. Ltd. ❖ Durrant Packagers Pvt. Ltd. ❖ Packman


WERED BY THE
CE BETWEEN US.
SULATED PACKAGING IS NOT
AME. WE DESIGNED THIS
CELL™ LINER WITH POCKETS
THAT INSULATE BETTER,
UR PACKAGE STAYS FRESH.
rPack™
TemperPack™
TemperPack™
TemperPack™

8. Trade Regulations and Barriers

8.1. India's Import Policy

India's import and export system is governed by the Foreign Trade (Development & Regulation) Act of 1992 as well as India's Export Import (EXIM) Policy.

The primary duty of every importer of plastic product in India is to obtain a registration with their regional licensing authority. An Import Export Code (IEC) is given by the Director General of the Foreign Trade Office to the importer, based on which all customs clearances shall be granted to the importer. This process to become an importer is a one-time process but renewal might be required of the same depending on the by-laws laid down by the regional licensing authority.

The Indian Trade Classification (ITC)-Harmonized System (HS) classifies goods into three categories:

- Restricted
- Canalized
- Prohibited

Any good not specified in the above categories can be freely imported, if the importer has obtained a valid IEC.

Restricted Items

Can be imported only after obtaining Import License. They must also be disposed in the manner specified by the Licensing Authority. An import license is valid for 24 months for capital goods and 18 months for all other goods.

Canalized Items

The items which can only be imported using specific methods or procedures of transport. These goods can be imported only through canalizing agencies. Petroleum based products are mostly canalized items.

Prohibited Items

These goods are strictly prohibited from being imported to India. Some examples of such items include wild animals, unprocessed ivory, etc.

All plastic upstream and downstream products and paper products (except for waste/scrap plastic and paper) may be imported into India under an Open General Licence (OGL), which means no specific licence is required to import plastic and paper into India. However, as applicable for any general imports, the import company must get an Import Export Code (IEC) issued by the Director General of Foreign Trade (DGFT), Ministry of Commerce.

The value of goods imported is determined based on the Customs Valuation (Determination of Value of Imported Goods) Rules, 2007. The Tariff Value on such imported goods are fixed by the Central Board of Excise & Customs (CBEC) for the different class of goods imported.

8.2. Major Packaging materials falling under the "Restricted" category of India's import policy

All the products falling under the "Restricted" category of India's import policy requires prior licensing/approval from various government bodies in India. The following HS Codes are "restricted" in India:

- HS 39151000 - Polymers of ethylene
- HS 391530- Polymers of vinyl chloride
- HS 39159010- Polypropylene
- HS 39159071 - cellulose and its chemical derivatives of regenerated cellulose

- HS 39169032- Polymerisation and copolymerisation products of polystyrene and polymethyl methacrylate of polymethyl methacrylate
- HS 48010010- Glazed newsprint
- HS 48025570- Paper for security printing,

India actively maintains a SCOMET list (Special Chemicals, Organisms, Materials, Equipment, and Technologies). The list includes materials that can be used for both civilian and military applications. Such materials require prior approval from a designated government body. Some packaging related materials falling under SCOMET list is given below.

- Nitrocellulose (used in packaging Inks)
- Fluro polymers (Used in Food and pharma packaging)
- Certain Biopolymers (that can be used on Biowarfare also)

Import of products in SCOMET list requires prior approval or licensing from concerned bodies in India

8.3. Legal Documents Required for Import

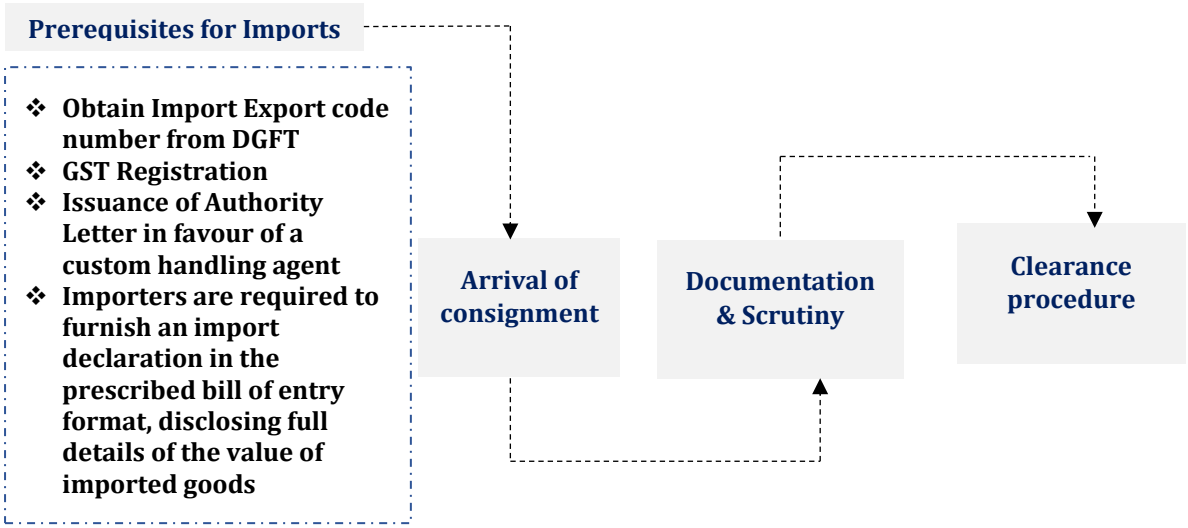
As per the rules laid down by the Central Board of Excise and Customs, there are a criterion of basic documentation which must be submitted at the time of import into India. The documents needed at the time of import are listed below:

Table 15: Legal documents required for import

Bill of Entry	This is a key document for all custom clearances. It must be filed within 30 days of arrival of goods at a customs location. All clearances, assessment and examination of goods are carried out after such bill of entry is filed.
Commercial Invoice	This document is the prime source for computing the value of the goods imported as per the relevant laws. The assessable value based on which the custom duty is charged is finalized based on such commercial invoice.
Bill of Lading/ Airway Bill	The bill of lading under sea shipment or airway bill under air shipment is a mandatory document for customs clearances. This document provides the details of cargo being carried with the terms of delivery.
Insurance Certificate	This is a supporting document against importer's declaration on terms of delivery. This document allows the custom officers to verify whether insurance is included in the selling price of the good and accordingly find an assessable value.
Purchase Order/ Letter of Credit	The terms and conditions of sale contract are detailed in the purchase order/letter of credit. The customs officials confirm the value of the assessable goods based on the conditions mentioned in these documents.
Dock Challan	It is a form to be filled for making the payment for dock charges. These charges are paid once all the other customs formalities are completed.

Specific documentation: There is no other specific documentation required for the import of plastic and paper products. However, the Customs Officer might demand additional documentation based on his judgment regarding the import shipment.

Figure 24 24: Import process in India



8.4. Import Duty Structure

For understanding the import duty structure for packaging products in India, we considered three HS Codes—HS 48191010 for cartons, boxes, cases, bags and other packing containers, of paper, paperboard, cellulose fibres, HS 39079900 for Polyacetals, Other Polyethers and Epoxide Resins, and HS 391290 for cellulose and Its chemical derivatives, not elsewhere specified or Included, in primary forms and other cellulose Propionate and aceto propionate, non-plasticized—were considered.

Table 16: Import duty structure for packaging products in India

Basic Customs Duty	**10%**
Social Welfare Surcharge (SWC)	**10%**
Customs AIDC	**10%**
Customs Health Cess	**0%**
Excise AIDC (EAIDC)	0%
GST Duty	0%
IGST Levy	18%
Total Duty	**32.16%**

Source: ICEGATE, Central Board of Indirect Taxes and Customs, Government of India

Table 17: Customs duty calculation structure

CUSTOMS DUTY	RATE OF DUTY (%)	HOW IS IT CALCULATED
Basic Customs Duty (BCD)	10%	BCD is levied on the real value of the product to be imported
Customs AIDC	10%	AIDC is calculated on the BCD
Customs Health Cess (CHCESS)	5%	CHCESS is levied on the sum of the real value of the product and the BCD

CUSTOMS DUTY	RATE OF DUTY (%)	HOW IS IT CALCULATED
Social Welfare Charge (SWC)	10%	SWC is levied on the BCD
IGST Levy	12%	IGST is levied on the sum of the real value of the product, BCD, AIDC, CHCESS, and SWC

9. Regulatory Landscape

9.1. Statutory and Non-statutory Quality Standards

The Bureau of Indian Standards has not prescribed any specific standards for Paper bags, but there are certain compulsory standards to be met for plastic bags. However, voluntary requirements that can be practiced in India for both paper and plastic carry bag products include Eco mark certification.

Additionally, foreign firms seek IPR/ Trademark protection and copyright infringement for the Indian market.

9.1.1. General Requirements for Paper Boards & Plastics excluding Laminate

All the packaging material manufactured should meet relevant standards of BIS (Bureau of Indian Standards) pertaining to safety, quality, and performance wherever applicable. The manufacturer of packaging material/package must produce:

- The consent clearance as per the provisions of Water (Prevention and Control of Pollution) Act, 1974
- The consent clearance as per the provisions of Air (Prevention and Control of Pollution) Act, 1981
- Along with the authorisation, if required, under the Environment (Protection) Act, 1986 and the rules made thereunder to
- Additionally, the manufacturer shall also comply with the provisions under prevention of Food Adulteration Act 1954 and rules made thereunder, wherever necessary.

9.1.1.1. Paper Bags

The Bureau of Indian Standards has not prescribed any standards for paper carry bags. The paper bags can be manufactured from different varieties of papers ranging from 44 GSM (Grams per Square Metre) to 160 GSM with Burst Factor ranging from 2 to 30. Besides Kraft paper, Wrapper paper, Art paper, Butter paper, wax coated paper also can be used to manufacture paper bag in India.

9.1.1.2. Plastic Carry Bags

The plastic packaging materials/packages used for packaging of food, pharmaceutical, cosmetics and drinking water shall comply with the relevant Indian standards and shall be manufactured from the plastics which shall comply with relevant Indian Standards.

The packaging material used for packaging of non-food, non-pharmaceutical, non-cosmetics and non-drinking water commodities shall be manufactured from recycled plastics which shall, apart from fillers and reinforcing agents, be a minimum of 30% by weight of compatible plastic wastes. The manufacturer shall provide documentary evidence by way of certificate or declaration to this effect to Bureau of Indian Standards while applying for Eco mark.

The latest drive by the Indian government on plastic waste has been to release the Plastic Waste (Management and Handling) Rules 2016.

9.2. Plastic Waste (Management and Handling) Rules, 2016

According to the Plastic Waste (Management and Handling) Rules, 2016, the minimum thickness of plastic carry bags used in the country was increased from 40 microns to 50 microns.[36] In addition to this, the Government introduced Extended Producer's Responsibility (EPR).

Under EPR, the producers, importers and brand owners of plastic carry bags, multi-layered plastic sachet, or pouches, were required to establish a system for collecting back the plastic waste generated

[36] Government Notifies Plastic Waste Management Rules, 2016, Press Bureau of India, March 2016

due to their products. Each company was to chalk out modalities for waste collection system based on Extended Producers Responsibility and involve the State Urban Development Departments. Furthermore, the plan for modalities of collection must be submitted to the State Pollution Control Boards while applying for consent to operate.

With respect to multi-layer packaging, the rules have made it mandatory for manufacturers to obtain a certificate from the State Pollution Control Board.

The Plastic Waste Management (PWM) Rules 2016 also encourages the use of compostable carry-bags and products by exempting minimum thickness criteria of 50 microns. Further, as per provisions of PWM Rules, 2016, the manufacturers or sellers of compostable plastic carry bags must obtain a certificate from the Central Pollution Control Board (CPCB) before marketing or selling their products.

9.3. Amendments to the Plastic Waste (Management and Handling) Rules, 2016

The amendments to the PWM Rules, 2016, prohibits the usage of single-use plastic from July 2022[37]. The government has banned the manufacture, import, stocking, distribution, sale and use of following single-use plastic, including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the 1st of July 2022:

- Ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration.
- Plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic, or PVC banners less than 100 micron, stirrers.

Furthermore, the thickness of plastic carry bags has been increased from 50 microns to 75 microns and to 120 microns with effect from the 31st of December 2022.

With respect to marking and labelling of packaging products, the following amendments were introduced:

- The producer or brand owner of the carry bags is required to mention information like name, registered number, and thickness of the carry bags. Earlier the same applied only to the manufacturer.
- For plastic packing, the information like name, the registered number of the manufacturer or producer or brand owner, and thickness needs to be mentioned.
- Multi-layered packaging used for imported goods is excluded from the requirement of mentioning of name and registered number of the manufacturer.

The government also released the Guidelines for the Extended Producers Responsibility under the amendment.

9.4. Extended Producers Responsibility

Extended Producer's Responsibility (EPR) aims to scale up plastic collection and recycling. Under the Plastic Waste Management Rules 2016, the Ministry of Environment, Forest, and Climate Change has recently proposed a Uniform framework for EPR implementation in India. Bioplastics have been excluded from the plastic waste management rules.

The Framework aims at implementing EPR along with third-party monitoring mechanisms by roping the private sector including brand manufacturers, producers, recyclers, and integrating the informal sector.

[37] Government notifies the Plastic Waste Management Amendment Rules, 2021, prohibiting identified single use plastic items by 2022, Ministry of Environment, Forest, and Climate Change, August 2021

The new draft framework also has provisions to impose stringent penalties on producers if they fail to meet their targeted collection.

The framework outlines three models of EPR implementation in India:

- Fee-based EPR model: Producers and brand owners using packaging quantity below a threshold will contribute to a central EPR corpus fund established in the form of an escrow account. The corpus will be used for funding various activities by ULB, recyclers or for IEC.
- PRO-based EPR model: PROs will manage implementation of packaging collection and recycling on behalf of producers, either individually or collectively. In return, PROs charge an EPR fee for the tonnage of packaging handled on behalf of their customer companies.
- Plastic credit based EPR model: Recyclers and re-processors can generate plastic credits for every ton of processed packaging. Producers and brand-owners will obtain plastic credits either from accredited processors or exporters as per the amount of packaging put on market and set targets.

9.5. Rules Specific to Manufacturers of Bioplastic

As per the PWM Rules, 2016 "compostable plastics" mean *plastic that undergoes degradation by biological processes during composting to yield CO2, water, inorganic compounds and biomass at a rate consistent with other known compostable materials, excluding conventional petro-based plastics, and does not leave visible, distinguishable or toxic residue.*

Therefore, in relation to bioplastics, the PWM Rules, lays down the following:

- The manufacturers or sellers of compostable plastic carry bags/products shall obtain a certificate from the Central Pollution Control Board before marketing or selling compostable carry bags/products.
- Every compostable plastic carry bag manufacturer/seller/stockist shall comply with the provisions under PWM Rules, 2016:
- The provision of minimum thickness of 50 micron is not applicable to carry bags made up of compostable plastic.
- Carry bags made from compostable material or plastics should conform to the Indian Standard: IS:17088 (as amended from time to time) titled as 'Specifications for Compostable Plastics'.
- Protocols for compostable plastic material: Determination of the degree of degradability and degree of disintegration of plastic material shall be as per the protocols of the Indian Standards IS/ISO: 17088 (as amended time to time).
- Marking or labelling: The information—name and certificate number in case of carry bags made from compostable plastic—should be printed in English and local languages. Each carry bag made from compostable plastics shall bear a label "compostable" and shall conform to the Indian Standard: IS/ISO-17088 (as amended from time to time) titled as "Specifications for Compostable Plastics".

9.6. Eco Mark

Eco mark is a certification mark issued by the Bureau of Indian Standards (the national standards organization of India) to products conforming to a set of standards aimed to generate least impact on the ecosystem. The marking scheme was started in 1991. One of the purposes of the mark is to increase awareness among the consumers towards reducing environment impact. The mark is issued on various product categories and the development of standards for more products is in progress.

The Bureau of Indian Standards also administers the Eco mark scheme. Packaging and packaging material is one of the product categories that have been identified for coverage under this scheme.

The Scheme applies to various household and other consumer products which meet certain environmental criteria. For the implementation of the scheme, BIS is responsible for the following functions:

- Assessment of the product for ECO Mark
- Certification of the product for award of ECO Mark.
- Renewal, suspension, and cancellation of the licence.
- Undertaking inspections and taking samples for analysis of any material or substance in relation to which the BIS - Eco mark has been used.

To operate the scheme, BIS has included additional requirements.

- The terms and conditions governing operation of the licences including fees shall be as per the Bureau of Indian Standards Act, Rules and Regulations framed thereunder.
- Marking fee would be separate - one with and the other without Eco mark requirements.
- Similarly, two types of schemes of testing and inspection have been prepared, one incorporating the additional requirements of the Eco Mark and the other for BIS Certification against Indian Standards.

Bureau of Indian Standards (BIS) has also been operating a Foreign Manufacturers Certification Scheme (FMCS) since the year 2000 under BIS Act, 1986 and Rules & Regulations framed there under. Under FMCS, licence is granted to a Foreign Manufacturer for use of BIS Mark on a product that conforms to an Indian Standard.

Once, the certification is completed:

- Products certified as eligible for the ECO Mark shall also carry the ISI Mark (except for leather) for quality, safety and performance of the product and shall be licensed to carry the ECO Mark for a prescribed time after which it shall be reassessed.
- The packaging material/package may display in brief the criteria based on which the product has been labelled as Environment Friendly
- The packaging material/package may be sold along with instruction for proper use and mode of safe disposal so as to maximise product performance and minimise wastage.
- It shall also be suitably mentioned that Eco mark label is applicable only to the packaging material/package, if content is not separately covered under Eco mark. It may be stated that the Eco mark is applicable to the product or packaging material or both.

10. Key Stakeholders

Table 18: Important Stakeholders

Sl. No.	Name of Institution/Regulatory Body	Location	Website
1.	**Indian Institute of Packaging (Ministry of Commerce)**	Mumbai	www.iip-in.com
Contact Person (Designation): N.C. Saha (Director) **Email id:** iip@iip-in.com **Contact Number:** 91- 22-28219803			
2.	**Indian Centre for Plastics in the Environment (Ministry of Environment and Forests)**	Mumbai	www.icpe.in
Contact Person (Designation): Anand Asthana (Director) **Email id:** icpe@icpe.in **Contact Number:** 91-22-22617137			
3.	**Indian Paper Manufacturers Association (IPMA)**	Delhi	www.ipma.co.in
Contact Person (Designation): AS Mehta (Vice President) **Email id:** sg@ipma.co.in **Contact Number:** 91-11-26518379			
4.	**All India Plastics Manufacturer's Association (AIPMA)**	Mumbai	www.aipma.net
Contact Person (Designation): Hiten Bheda (President) **Email id:** office@aipma.net **Contact Number:** 91-22-67778899			
5.	**Retailer's Association of India (RAI)**	Mumbai	www.rai.net.in
Contact Person (Designation): Hitesh Bhatt (Director-Marketing) **Email id:** hitesh@rai.net.in **Contact Number:** 91-9987343344			
6.	**Packaging Industry Association of India (PIAI)**	Mumbai	www.piai.org
Contact Person (Designation): Chandrakant Salunkhe (CEO) **Email id**: president@smechamber.com **Contact Number:** 91-22-61509833			
7.	**Ministry of Environment, Forest and Climate Change**	Delhi	www.envfor.nic.in

Sl. No.	Name of Institution/Regulatory Body	Location	Website
Contact Person (Designation): Kushal Vashist (Director) **Email id**: Kushal.vashist@gov.in **Contact Number:** 91-11-24695382			
8.	**Bureau of Indian Standards**	Delhi	www.bis.gov.in
Contact Person (Designation): Ms. Surina Rajan (Director General) **Email id**: dg@bis.gov.in **Contact Number:** 91-11-23237991			
9.	**Central Institute of Plastic Engineering & Technology**	Chennai	www.cipet.gov.in
Contact Person (Designation): Dr. Shishir Sinha (Director General) **Email id**: **shishir@cipet.gov.in** **Contact Number:** +91-44-22254780			
10	**Food Safety and Standards Authority of India**	Delhi	www.fssai.gov.in
Contact Person (Designation): Ms Preeti (Assistant General) **Email id**: **ao@fassai.gov.in** **Contact Number:** +91- 120-2987571			

11. Trade Events

Table 19: Important Industry Trade Events

Sl. No.	Trade Events	Dates	Venue	Segment	Website
1	**PackPlus**	19th-21st August 2022	Pragati Maidan, New Delhi	Packaging	www.packplus.in
2	**Paperex**	10th-13th May 2022	India Expo Centre, Greater Noida, Uttar Pradesh	Paper, Pulp	india.paperex-expo.com
3	**Printpack India**	26th-30th May 2022	India Expo Centre, Greater Noida, Uttar Pradesh	Packaging & Print	www.printpackipama.com
4	**Plastasia**	20th-23rd April 2022	Pragati Maidan, New Delhi	Plastics	www.plastasia.in
5	**Mapic India**	12th-13th October 2022	Renaissance Hotel, Mumbai, Maharashtra	Retail	www.mapic-india.in
6	**Pacprocess & food pex**	23rd-25th November 2022	Bombay Exhibition Centre, Mumbai	Processing & Packaging	www.pacprocess-india.com
7	**PackEx**	14th-16th September 2022	Bombay Exhibition Centre, Mumbai	Packaging	www.packexindia.com

Source: Event Websites

12. Conclusion

Sustainable packaging innovations are at a nascent stage of development in India. The table below illustrates the development stage of each segment in the Indian sustainable packaging value chain and potential for Finnish companies

Table 20: Development stage of Sustainable Packaging sub-segments in India

Segments	Sub-segments	Growth stage	Potential for Finnish businesses
Sustainable plastic packaging	Bio-based compostable plastic packaging (PLA, PHA, PBS)	Developing stage (5)	High
	Fossil-based compostable plastic packaging (PBAT,PCL)	Developing stage (5)	Moderate
	Fossil-based non-compostable plastic packaging (PET, PP, PE)	Moderately developed stage (7)	Low
	Bio-based non-compostable plastic packaging (Bio-PET, Bio-PE)	Moderately developed stage (7)	Moderate
Paper-based packaging solutions	Kraft paper-based packaging	Developing stage (5)	High
	Cardboard-based packaging	Developing stage (5)	High
	Paperboard-based packaging	Developing stage (5)	High
	Composite paper-based packaging	Developing stage (5)	High
Innovative fibre-based packaging	Bamboo packaging	Developing stage (5)	High
	Cellulose-based packaging	Developing stage (5)	High
Eco-waste-based packaging solutions	Sugarcane-based packaging	Developing stage (5)	High
	Wheat straw-based packaging	Developing stage (5)	High

13. Bibliography

1. Bakshi, S, Kaur, M, Gautam, S (2021); *Circular Economy for Plastics in India: Roadmap,* The Energy and Resources Institute, India
2. Bhandare, N, Sundersan, G (2020); *Plastic Packaging, The Sustainable and Better Choice,* FICC, PWC, India
3. Pulla, P (2020); *Bioplastics: A solution for solving India's plastic problem;* The Hindu
4. Chowdhury, S (2021); *Biopolymers: Smart solution for solving the plastic waste problem;* Financial Express
5. Singh, G S, (2021); *Draft plastic waste rules: Why multi-layered plastic needs to be phased out;* Down To Earth
6. Singh, G S, (2021); *Draft Plastic Waste Management Rules, 2021: Addressing the bigger problem;* Down To Earth
7. Singh, G S, (2021); *Draft extended producer responsibility policy: How gaps in achieving fundamental goals can be closed;* Down To Earth
8. *India's plastic waste generation has more than doubled in 5 years;* Press Trust of India
9. Srivastava, R (2021); *India's plastic waste situation wasn't created today;* Down To Earth
10. Venkatesh, S, Kukreti, I (2019); *An Indian consumes 11kg plastic every year and an average American 109kg;* Down To Earth, 2018
11. Cavale, S (2021); *Pepsi-co to reduce plastic wastage in India;* Reuters
12. Kalita, K (2019); *India's first biodegradable plastic developed in IIT Guwahati;* Times of India
13. Ganguly, S (2021); *How this Pune-based start-up is upcycling crop residue into packaging material, particle boards;* Your Story
14. Kalsi, H (2020); *How Ecoware became India's disruptive sustainable packaging brand;* Time of India
15. Wangchuk, R N (2021); *Gurgaon-Based Brothers Make Bioplastic From Corn Starch That Composts in 6 Months;* The Better India
16. *Gravicky Lab's innovation in recycling pollution;* Times India; 2019
17. *Nandu's becomes India's first meat-based start-up to use sustainable packaging;* Press Bureau of India; 2021
18. *Indian packaged food market to be doubled in 10 years;* Press Trust of India; 2019
19. *Growing sustainable packaging trends in India;* HB Fuller; 2020
20. *Indian Packaging Sector-An outlook of the industry;* Invest India; 2021
21. *Government Notifies Plastic Waste Management Rules, 2016,* Press Information Bureau of India, 2016
22. *Government notifies the Plastic Waste Management Amendment Rules, 2021, prohibiting identified single use plastic items by 2022;* Ministry of Environment, Forest, and Climate Change, Government of India; 2021
23. *Guideline Document on Extended Producer's Responsibility;* Ministry of Environment, Forest, and Climate Change, Government of India; 2020
24. *ITC, Invest India join hands to find substitution for single-use plastic;* Press Bureau of India; 2021
25. *Strategies for Sustainable Plastic Packaging in India;* FICCI-Accenture; 2020
26. *Plastic Waste Management-Issues, Solutions, & Case Studies;* Ministry of Housing and Urban Affairs, Government of India; 2020
27. *Factsheet on Plastic Waste in India*, The Energy and Resources Institute, India; 2018
28. *Plastic Films, The Growth Wrap,* Edelweiss; 2019