FROST & SULLIVAN

Market Assessment of Machinery for Technical Textiles with Emphasis on Woven Fabric and Sack Production

Final Report

SUBMITTED TO
LOHIA CORP LIMITED
17 June 2026

Contents

DISCLAIMER

The market research process for this study has been undertaken through both secondary research and primary research, which involves discussing the market status with leading participants and experts. The research methodology used is Expert Opinion Methodology. Quantitative market information was sourced through primary research interviews and trusted portals; therefore, the information is subject to fluctuations due to potential changes in the business and market climate. Frost & Sullivan's estimates and assumptions are based on a combination of quantitative and qualitative analyses, including industry journals, company reports, and publicly available information.

Forecasts, estimates, predictions, and other forward-looking statements contained in this report are inherently uncertain because of changes in factors underlying their assumptions, or events or combinations of events that cannot be reasonably foreseen. Actual results and future events could differ materially from such forecasts, estimates, predictions, or statements.

This study has been prepared for inclusion in the draft red herring prospectus ("DRHP"), red herring prospectus ("RHP") and the prospectus of "Lohia Corp Limited" ("the Company") concerning an initial public offering in connection with its listing on the Indian Stock Exchange.

This report and extracts thereof are for use in the draft red herring prospectus, red herring prospectus, and the prospectus issued by the Company and all presentation materials (including press releases) prepared by or on behalf of the Company (and reviewed by Frost & Sullivan) about the listing exercise. The company is permitted to use it in both internal and external communications as needed in the context of the Listing exercise. However, no part of the report may be distributed for any other commercial gain to parties not connected with the said Listing exercise.

This report has exclusively been prepared for the consumption of "Lohia Corp Limited", and any unauthorized access to or usage of this material by others is forbidden and illegal.

Frost & Sullivan has prepared this study independently and objectively, taking adequate care to ensure its accuracy and completeness. Our research has been conducted with an "overall industry" perspective, and it will not necessarily reflect the performance of individual companies in the industry. Frost & Sullivan shall not be liable for any loss suffered because of reliance on the information contained in this study. This study should also not be considered as a recommendation to buy or not buy the shares of any company or companies as mentioned in it or otherwise.

ABBREVIATIONS

Title	Abbreviations
APAC	Asia-Pacific
CAGR	Compound Annual Growth
CPI	Consumer Price Index
CY	Calendar Year (January to December)
FTA	Free Trade Agreement
FY	Financial Year (April to March)
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GVA	Gross Value Added
IMF	International Monetary Fund
IIP	Index of Industrial Production
LATAM	Latin America
MEIS	Merchandise Exports from India Scheme
MoSPI	Ministry of Statistics and Programme Implementation
MSMEs	Micro, Small, and Medium Enterprises
OPEC	Organization of Petroleum Exporting Countries
VAT	Value Added Tax
PP	Polypropylene
HDPE	High Density Polyethylene

Global Macro-Economic Overview

1.1. Macro-Economic Trends of the Global Economy

As of 2025, the global economy is navigating a phase of moderate but uneven growth, with an overall GDP expansion projected at around 3.2%. While emerging markets like India, Vietnam, and select African economies continue to outperform, many advanced economies like Germany, Italy, and Japan are settling into a low-growth environment due to aging populations, high debt levels, and subdued productivity. Central banks, after aggressive interest rate hikes since 2022 to contain inflation, are now maintaining tight monetary conditions, which continue to weigh on consumption and investment. Simultaneously, there is a visible realignment of global supply chains, as companies diversify manufacturing away from China—a shift benefiting countries such as Mexico, India, and Southeast Asian nations.

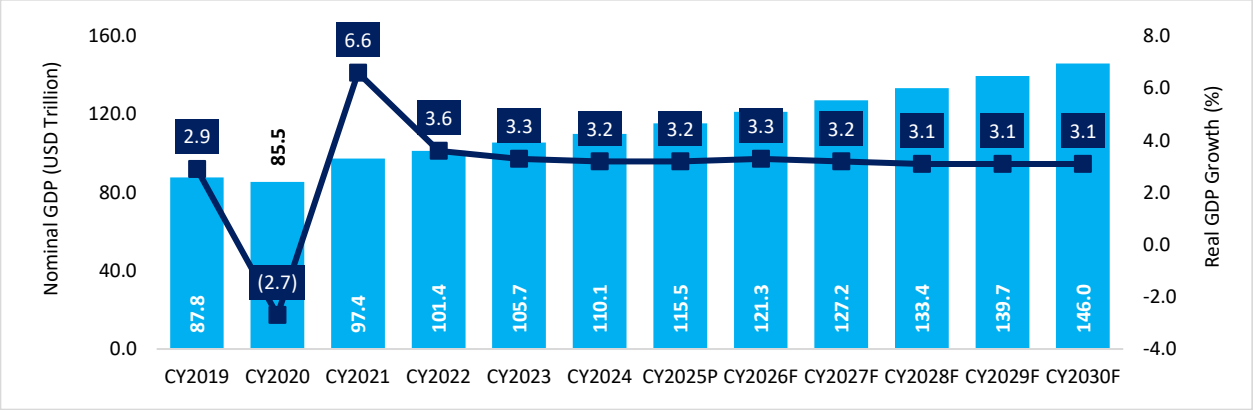
Demographic challenges are becoming more pronounced, particularly in China, Europe, and Japan, while younger economies have a window of opportunity to leverage their demographic dividend, provided they invest in education, skilling, and infrastructure. The green and digital transitions are reshaping global investment patterns, as governments and firms focus on sustainability, clean energy, and AI-led transformation. However, these shifts also bring transitional risks and require careful policy navigation. Meanwhile, rising geopolitical tensions, trade fragmentation, and regional conflicts have increased macroeconomic volatility and reduced global policy coordination.

In this landscape, labor markets are evolving rapidly, influenced by automation and remote work trends, creating new opportunities but also widening skills mismatches. Overall, the global macroeconomic outlook reflects a world in transition moderate in growth, high in uncertainty, and increasingly defined by how well nations adapt to structural shifts in demographics, technology, and climate policy.

1.2. Overview and Outlook of Global GDP Trends

From 2026 to 2030, global nominal GDP is projected to grow at a CAGR of 4.9%, reaching approximately USD 146.0 trillion, with real GDP growth averaging 3.2% annually. Emerging markets are expected to lead this growth, driven by favorable demographics, expanding manufacturing capabilities, and cost-competitive labor. These economies also stand to benefit from strategic investments in green energy, digital infrastructure, and technological innovation.

Exhibit 1.1: Nominal GDP (in USD Trillion) and Real GDP Growth (%), Global, Calendar Year (CY)2019-CY2030F



Note: E: Estimate, F: Forecast, Global Nominal GDP, and Real GDP Growth are represented in calendar years
Source: International Monetary Fund (IMF): World Economic Outlook (WEO), October 2024, Frost & Sullivan

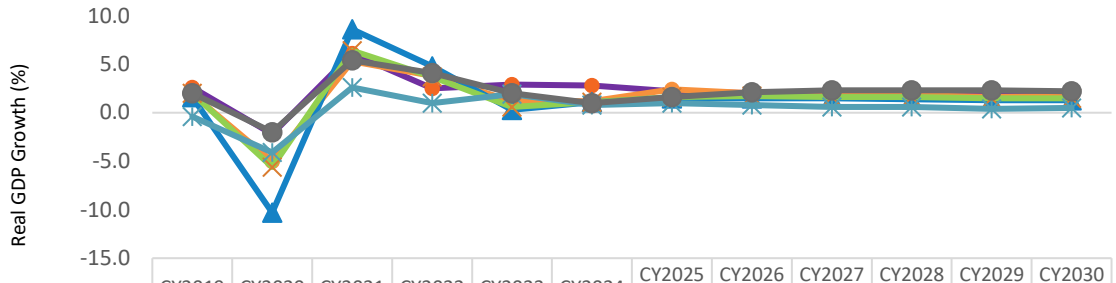
In contrast, advanced economies face challenges from supply chain vulnerabilities and energy transitions, emphasizing the importance of long-term planning and innovation to address structural limitations. Inflation is set to ease steadily, with headline inflation averaging 4.3% by 2025, down from 5.8% in 2024. While non-energy goods inflation is expected to moderate significantly, persistent wage pressures and tight labor markets will keep core inflation elevated until early 2025. Central banks are expected to lower rates, with the Fed's policy rate projected at 3.00%–3.25% by the end of 2025. These adjustments will bolster emerging markets by moderating inflation and supporting global monetary conditions.

1.3. Growth Outlook on Key Advanced Economies

The United States maintained solid momentum with GDP growth of 2.9% and 2.8%, respectively, supported by consumer demand and federal investments. However, growth is expected to gradually ease to 2.1% by 2030, as demographic headwinds and tighter financial conditions limit expansion, despite ongoing innovation and reshoring efforts.

Canada experienced slower growth, at 1.2% in 2023 and 1.2% in 2024, primarily due to housing market pressures and export softness. Looking ahead, growth is projected to improve to 1.7% by 2030, aided by population growth through immigration and increased investment in clean energy infrastructure.

Exhibit 1.2: Real GDP Growth (%), Key Advanced Economies, CY2019-CY2030F



	CY2019	CY2020	CY2021	CY2022	CY2023	CY2024	CY2025 P	CY2026 F	CY2027 F	CY2028 F	CY2029 F	CY2030 F
United States	2.6	-2.2	6.1	2.5	2.9	2.8	2.2	2.0	2.1	2.1	2.1	2.1
Canada	1.9	-5.0	5.3	3.8	1.2	1.2	2.4	2.0	1.8	1.8	1.6	1.7
United Kingdom	1.6	-10.3	8.6	4.8	0.3	1.1	1.5	1.5	1.5	1.4	1.3	1.3
European Union	2.0	-5.6	6.4	3.7	0.6	1.1	1.6	1.7	1.6	1.6	1.5	1.5
Japan	-0.4	-4.1	2.6	1.0	1.9	0.8	1.0	0.8	0.6	0.6	0.4	0.5
Australia	2.0	-2.0	5.4	4.1	2.0	1.0	1.6	2.1	2.3	2.3	2.3	2.2

Source: IMF: WEO, Frost & Sullivan

The United Kingdom saw minimal recovery, with just 0.3% growth in 2023 and a slight rebound to 1.1% in 2024, as the economy continues to grapple with Brexit-related disruptions, weak investment, and inflation. Long-term growth is expected to remain modest, reaching 1.3% by 2030, unless significant reforms are undertaken.

The European Union posted 0.6% growth in 2023 and 1.1% in 2024, as energy shocks eased and industrial activity began to recover. Forecasts suggest a gradual improvement to 1.5% by 2030, supported by the green transition and digital investment, though aging populations and structural rigidities remain challenges.

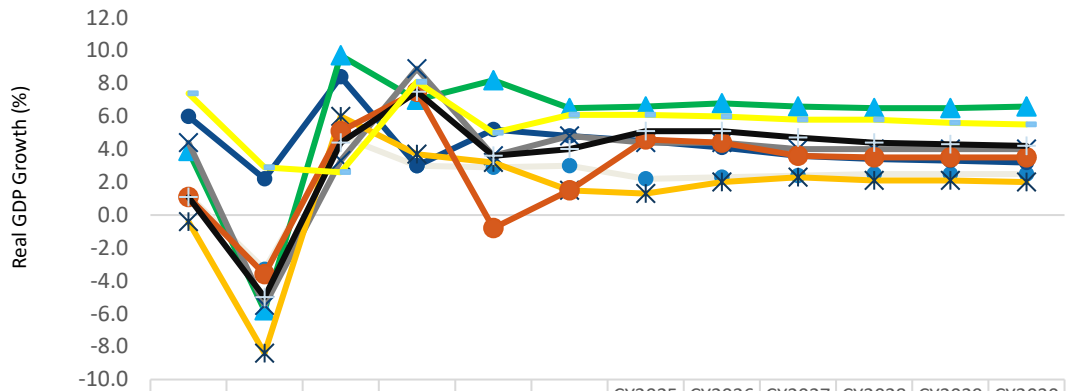
Advanced economies are entering a phase of stable but subdued growth through 2030, following the temporary rebound seen in 2023 and 2024. While countries like the United States may sustain relatively better momentum due to innovation and consumer strength, others—such as the UK, Canada, and the EU—face more pronounced constraints. Despite investments in green energy, digital transformation, and industrial policy, most advanced economies are likely to remain in a low-growth equilibrium, with annual growth rates ranging between 1.3% and 2.1%

1.4. Growth Outlook on Key Emerging Markets

Brazil's economy is projected to slow down to 2.2% in 2025 and stabilize at 2.5% by 2030. China's growth, after recovering to 4.8% in 2024, is expected to decline steadily to 3.2% by 2030. India's resilient economy grew at 6.5% in 2024, and is forecasted to stabilize at 6.6% through 2030. Malaysia's growth rebounded to 4.8% in 2024 and is projected to stabilize at 4.0% from 2027. Mexico's economy slowed to 1.5% in 2024 but is expected to improve to 2.3% by 2027. Saudi Arabia's GDP is expected to see a recovery to 4.6% in 2025 before moderating to 3.5% by 2028.

The UAE is projected to reach 5.1% in 2025 before softening to 4.2% by 2030. Vietnam's economy strengthened to 6.1% in 2024, with growth expected to taper slightly to 5.5% by 2030.

Exhibit 1.3: Real GDP Growth (%), Key Emerging Markets, CY2019-CY2030F



	CY2019	CY2020	CY2021	CY2022	CY2023	CY2024	CY2025 P	CY2026 F	CY2027 F	CY2028 F	CY2029 F	CY2030 F
Brazil	1.2	-3.3	4.8	3.0	2.9	3.0	2.2	2.3	2.4	2.5	2.5	2.5
China	6.0	2.2	8.4	3.0	5.2	4.8	4.5	4.1	3.6	3.4	3.3	3.2
India	3.9	-5.8	9.7	7.0	8.2	6.5	6.6	6.8	6.6	6.5	6.5	6.6
Malaysia	4.4	-5.5	3.3	8.9	3.6	4.8	4.4	4.4	4.0	4.0	4.0	4.0
Mexico	-0.4	-8.4	6.0	3.7	3.2	1.5	1.3	2.0	2.3	2.1	2.1	2.0
Saudi Arabia	1.1	-3.6	5.1	7.5	-0.8	1.5	4.6	4.4	3.6	3.5	3.5	3.5
United Arab Emirates	1.1	-5.0	4.4	7.5	3.6	4.0	5.1	5.1	4.7	4.4	4.3	4.2
Vietnam	7.4	2.9	2.6	8.1	5.0	6.1	6.1	6.0	5.8	5.8	5.6	5.5

Source: IMF: WEO, Frost & Sullivan

Between 2025 and 2030, global growth patterns across emerging economies show a clear divergence. China, while still influential, is entering a phase of gradual deceleration, with growth falling from 8.4% in 2021 to 4.8% in 2024, and projected to decline further to 3.2% by 2030 due to demographic aging, real estate challenges, and reduced export competitiveness. Vietnam continues to outperform in ASEAN, growing 6.1% in 2024, and is expected to maintain a strong ~5.5% pace through 2030, supported by manufacturing, FDI, and favorable demographics. The UAE and Saudi Arabia have rebounded well post-pandemic, with the UAE growing at 4.0% in 2024 and expected to rise slightly to 4.2–4.3%, driven by tourism and logistics. Saudi growth has moderated to ~3.5% as it advances economic diversification. Malaysia's recovery has stabilized at 4.0%, fueled by electronics and commodity exports. Brazil faces fiscal challenges, keeping growth around 2.5%, while Mexico's recovery remains slow, with growth hovering at 2.0–2.1% due to structural constraints.

From 2025 to 2030, India has firmly established itself as the fastest-growing major economy in the world, consistently outperforming its global peers. After recording a strong 6.5% real GDP growth in CY2024, India is projected to sustain annual growth rates of 6.5–6.6% through the rest of the decade. This enduring momentum reflects the strength of its domestic consumption, robust infrastructure investments, and a thriving services and manufacturing base. Government initiatives like the

Production Linked Incentive (PLI) schemes, expanded capex spending, and digital financial inclusion have significantly enhanced India's economic capacity and resilience.

Unlike many other major economies facing structural slowdowns or demographic pressures, India continues to benefit from a young and expanding workforce, rising urbanization, and increasing foreign direct investment. Its tech-enabled governance, growing export capabilities, and push for green and digital infrastructure further solidify its long-term growth prospects. With these advantages, India is not only expected to remain the fastest-growing large economy globally, but also to emerge as the world's third-largest economy by 2030.Global Agencies on India's Economic Outlook for 2025–26

Global agencies have reiterated their confidence in India's economic trajectory, though with some downward revisions due to emerging global risks. The International Monetary Fund (IMF) projects India's GDP growth at 6.2% in 2025, slightly lowered than its earlier estimate of 6.5%, citing trade disruptions and global economic uncertainty, particularly the impact of recent U.S. tariffs. However, it expects growth to improve to 6.5% in 2026, driven by strong domestic consumption, particularly in rural areas, and steady macroeconomic fundamentals. The World Bank, in its June 2025 Global Economic Prospects, maintains a 6.3% growth estimate for 2025, revising it down from 6.7% earlier. It attributes the downgrade to softer global demand and rising trade barriers, but highlights India's resilient services sector, infrastructure spending, and public investments as key growth drivers. The Bank expects growth to bounce back to 6.5% in 2026. The Asian Development Bank (ADB) offers the most optimistic forecast, projecting 6.7% growth in 2025 and 6.8% in 2026. While it acknowledges risks from weaker exports and global demand, ADB sees India's strong consumer demand, expanding manufacturing base, and government-led infrastructure push as major positives. All three agencies recognize India's continued strength as the fastest-growing major economy, supported by domestic resilience. However, they also flag external vulnerabilities, especially related to evolving global trade policies and protectionist pressures.

The World Bank maintains a constructive outlook, highlighting India's resilient consumption and investment cycle, while noting external headwinds from weak global growth and geopolitical risks. The Asian Development Bank (ADB) has taken a more optimistic view, upgrading India's FY26 growth outlook to around 7.2%, driven by improving private consumption, infrastructure spending, and manufacturing momentum. Global credit rating agencies such as S&P Global also forecast growth of around ~6.5%, underpinned by macroeconomic stability, easing inflation, and strong medium-term fundamentals. Overall, while global agencies acknowledge downside risks from external factors, India's growth outlook for 2025–26 remains robust and structurally stronger than most large economies.

1.5. Global Manufacturing Shift and Diversification Away from China and Europe

The global manufacturing landscape is undergoing a marked shift as businesses diversify from China, driven by demographic, economic, and geopolitical factors. China's population over 65 years is projected to rise to 17.4% by 2029, leading to a shrinking labor force, reduced productivity, and heightened fiscal pressures for pension and public healthcare reforms. Geopolitical tensions over Taiwan and the South China Sea amplify trade risks, while high corporate debt, particularly in the real estate sector—coupled with falling property prices, dampens economic growth and investor confidence. Financial inefficiencies further exacerbate the issue, with concentrated loans in state enterprises and inconsistent government interventions undermining economic stability.

Many European businesses are struggling with rising energy costs and weakening consumer spending as households allocate more to energy expenses. Energy-intensive industries are under pressure, disrupting operations and profitability. This disparity in energy prices is driving some industries to consider relocating to India, offering a potential boost to India's manufacturing sector. Trade relations with key markets such as the EU, the U.S., and Japan are expected to wane, prompting companies to explore alternative manufacturing destinations.

India has emerged as a significant beneficiary of this shift, leveraging fiscal incentives and a burgeoning semiconductor manufacturing sector, with three major plants under development: the Tata-Powerchip fabrication facility in Dholera (Gujarat), Tata's OSAT unit in Morigaon (Assam), and the CG Power–Renesas–Stars Microelectronics plant. These initiatives are backed by policies that actively encourage the growth of ancillary industries. India also plans to replicate China's e-commerce integrated pilot zones near airports to streamline customs processes, a step toward achieving its ambitious USD 1 trillion goods export target by 2030. Southeast Asian countries, especially Vietnam, are capitalizing on their competitive edge. Its participation in free trade agreements like CPTPP2 and EVFTA3 enhances its attractiveness for high-tech manufacturing. In Latin America, Uruguay, Chile, Costa Rica, and Brazil are emerging as strong candidates for nearshoring, driven by free trade zones, infrastructure upgrades, political stability, skilled labor availability, and improved logistical frameworks. These developments reflect a reorientation of global manufacturing hubs, driven by strategic considerations of cost, geopolitical stability, and the need for supply chain resilience.

1.6. India's Strategic Advantage: Emerging as a Key Beneficiary of the China+1 and EU+1

Strategic Position in Global Supply Chains: India is emerging as a key player in the global China+1 and Europe+1 strategies. In FY25, manufacturing contributed approximately 14.2% to total GVA, with leading sectors including metal products (18.1%), textiles and apparel (11.3%), and transport equipment (10.2%). Traditional industries like chemicals (9.5%) and food & beverages (9.3%)

[2] Comprehensive and Progressive Agreement for Trans-Pacific Partnership

[3] EU-Vietnam Free Trade Agreement

remained stable, while electronics (5.6%) continued their upward trend, reflecting strong export growth and rising domestic demand.

Focus on High-Value Industries: The India Semiconductor Mission, with INR 760 billion in funding and INR 1.5 trillion in private investments, showcases India's focus on high-value industries. Supporting policies like the Design Linked Incentive scheme and the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors are driving growth in aerospace & Defense, electrical machinery, and pharmaceuticals.

Geopolitical Challenges and Opportunities: Geopolitical tensions involving Russia have disrupted supply chains in industries like automotive and steel. Rising raw material costs have pressured profitability. However, India's diversification of energy imports and renewable energy investments under Atmanirbhar Bharat are enhancing resilience and creating opportunities in export-driven sectors.

Policy and Workforce Strengths: Initiatives, like Make in India, cost-competitive labour, and a rapidly upskilling workforce, are transforming India into a reliable manufacturing hub. Investments such as INR 88 billion by 32 companies under the PLI scheme for large-scale electronics manufacturing will support workforce growth.

1.7. Tariffs Imposed by the United States and their Implications on India

The US tariff escalation of 2025 - which had raised overall duties on Indian exports to as high as 50% by August 2025 - created a material short-term headwind for Indian merchandise exports, with volumes to the US declining approximately 28.5% between May and October 2025. This situation has since seen a decisive resolution. On February 2, 2026, President Trump and Prime Minister Modi announced an India-US Bilateral Trade Agreement (BTA), reducing the effective tariff on Indian goods from 50% to approximately 18% - comprising an 18% reciprocal tariff with the additional 25% punitive duty linked to India's Russian oil imports fully rescinded.

1.8. Impact of the West Asia Conflict

The conflict in West Asia, which escalated following the US-Iran war that began on February 2026, has disrupted global energy and petrochemical supply chains through the effective closure of the Strait of Hormuz. The IMF revised global GDP growth for 2026 downward to 3.1% from a pre-conflict estimate of 3.4%, while global headline inflation is projected to rise to 4.4% before declining in 2027. Brent crude surged above USD 100 per barrel at peak disruption and is forecast to average USD 86 per barrel for the year, compared to USD 69 per barrel in 2025.

For India's woven raffia and FIBC industry, the more direct consequence is on raw material costs. Polypropylene prices rose by over 40% within two weeks of the conflict's outbreak, driven by a surge in naphtha prices - a key feedstock for propylene. Even in the event of a sudden reopening of the

Strait of Hormuz, a risk premium is expected to remain in crude prices through at least the rest of 2026. Higher input costs compress margins for raffia manufacturers and may, over time, accelerate investment in more productive and material-efficient machinery.

India Macro-Economic Overview

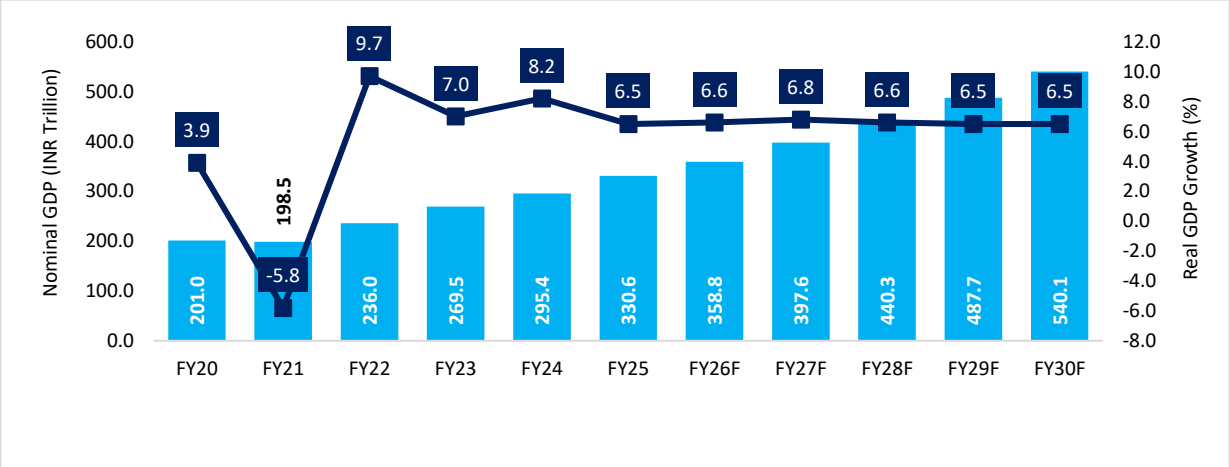
2.1. Macro-economic Overview of the Indian Economy

Indian economic growth in FY25 outperformed many other major economies and was least impacted by the inflationary pressures globally. The government has been promoting structural reforms, such as a focus on disinvestment and higher FDI limits, while also working on a national logistics policy to promote India's economic growth post-pandemic. India's FY2025 budget emphasizes nine key priorities aimed at achieving 'Viksit Bharat' or a 'Developed India. These priorities include a) enhancing productivity and resilience in agriculture, b) fostering employment and skilling, c) promoting inclusive human resource development and social justice, d) boosting the manufacturing and services sectors, e) advancing urban development, f) ensuring energy security, g) investments in infrastructure, h) innovation and i) implementation of next-generation reforms. These priorities further underscore the government's vision for sustainable growth and development across multiple sectors.

In CY2019, the Indian government set a target of becoming a USD 5 trillion economy and a global powerhouse by FY25. As a result of the COVID-19 pandemic, the government revised the original timeline by 18–24 months. India crossed the USD 3 trillion mark in FY2022. According to the IMF's updated outlook, India is projected to surpass the $4 trillion threshold in FY26 and expand to roughly $4.96 trillion by FY28. India is now expected to hit the $5 trillion economy milestone in FY29, a full year later than previously projected, according to the IMF's latest consultation report released on November 26, 2025.

2.2. Real and Nominal GDP Growth in India: GDP Growth Trends

Exhibit 2.1: Nominal GDP (in INR Trillion) and Real GDP Growth (%), India, Fiscal Year (FY) 2020 to FY2030F



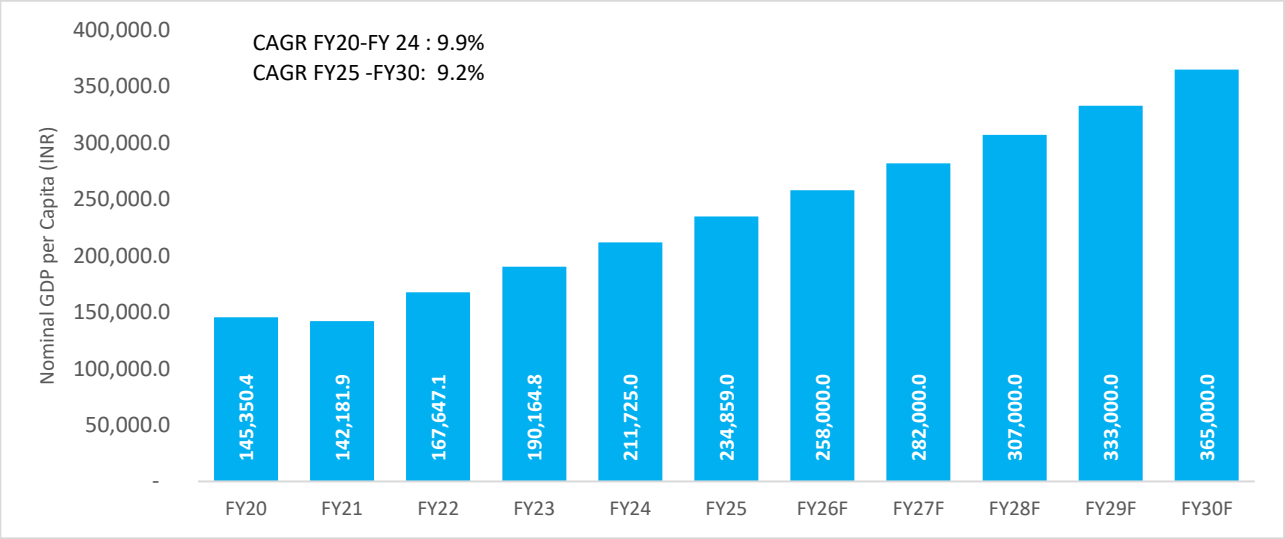
Source: IMF, News Articles, Frost & Sullivan

India's real GDP displayed resilience with a strong rebound of 9.7% in FY2021- 22, following a sharp contraction of 5.8% in FY2020- 21 due to COVID-19, and maintained steady growth at 7.0% and 8.2% in FY2022- 23 and FY2023- 24, respectively. Nominal GDP surged by 46.9% from FY2019- 20 to FY2023-24, reaching INR 295.4 trillion, reflecting rising economic activity. Projections indicate sustained growth momentum with nominal GDP projected to reach INR 540.1 trillion by FY2029 -30, driven by a robust consumer base, competitive labor costs, and government-led CAPEX. Structural reforms, increasing digitalization, and expanding global trade integration further position India as a key player in the global economy, underscoring its potential to exceed USD 7 trillion in nominal GDP within the next decade.

2.3. Outlook on GDP Per Capita of India

India's economic growth is marked by a significant rise in GDP per capita, growing from INR 145.4 thousand in FY2019- 20 to INR 234.8 thousand in FY2024- 25 at a CAGR of 9.9%, and projected to reach INR 365.0 thousand by FY2029-30, reflecting an improved CAGR of 9.2% in the forecast period.

Exhibit 2.2: Nominal GDP per Capita (in INR), India, FY2020 to FY2030F



Source: IMF, News articles, Frost & Sullivan

In FY2024–25, India's merchandise exports stood at US$437.70 billion, while non-petroleum exports rose to US$374.32 billion, growing 6.07% YoY. While services exports (particularly IT and business services) further enhance India's external earnings, merchandise exports remain a critical pillar of industrial and manufacturing activity supporting job creation, forex reserves, and value-added output. As India continues to strengthen its manufacturing base through schemes like PLI and export diversification efforts, the role of merchandise exports in per capita income generation is expected to grow further over the next several years.

This growth is also fueled by transformative reforms, improved infrastructure, initiatives like "Make in India" and the PLI scheme, and investments in renewable energy, healthcare, and education. India's digital ecosystem now exceeds 1 billion internet users, powering one of the world's most dynamic digital economies. UPI continues to underpin massive digital payment adoption, processing tens of billions of transactions, while the broader fintech market valued at approximately USD 110 billion in 2024 is poised for substantial growth as digital inclusion and financial services innovation deepen..With its demographic dividend, innovation-led startup growth, and deepening global integration, India is set to sustain its momentum, driving resilience, inclusivity, and global influence.

2.4. Key Growth Drivers for the Indian Economy

A combination of structural strengths and evolving macroeconomic drivers underpins India's economic growth. Together, these factors are shaping a long-term growth story that positions India as one of the world's fastest-growing major economies.

1. Favourable Demographics

India has one of the youngest populations globally, with a median age of around 28 years. Over 65% of the population is in the working-age group, offering a demographic dividend that can fuel productivity, savings, and consumption over the next two decades. This large, dynamic workforce presents immense potential for innovation, labor-intensive manufacturing, and services-led exports.

2. Rapid Urbanization

India's urban population is projected to increase from ~35% today to over 40% by FY2030. This shift is creating massive demand for infrastructure, housing, transport, utilities, and digital services. Urbanization also boosts productivity and income through better access to education, healthcare, and job opportunities, enabling a virtuous cycle of growth.

3. Regulatory Reforms

Over the past decade, India has undertaken key structural reforms to enhance economic efficiency and ease of doing business. Initiatives such as GST implementation, Insolvency and Bankruptcy Code, Production Linked Incentive (PLI) schemes, and liberalized FDI norms have improved transparency, reduced transaction costs, and attracted global capital. Ongoing reforms in land, labor, and digital governance continue to strengthen India's investment climate.

4. Rise in Per Capita Gross Net Disposable Income

With rising incomes and a growing middle class, India's per capita disposable income is steadily increasing, enhancing purchasing power and shifting consumption patterns. As of FY25, nominal GDP

per capita is estimated at ₹210,000, with a consistent upward trend projected over the next five years. This income growth fuels higher savings, better living standards, and increased participation in the formal economy.

5. Rise in Private Final Consumption Expenditure (PFCE)

Consumption is the most significant component of India's GDP, accounting for nearly 60% of total output. PFCE continues to rise, driven by the recovery of rural demand, urban consumption, digital retail expansion, and credit availability. Rising aspirations, growing access to goods and services, and financial inclusion are all contributing to sustained consumption growth, making India a demand-driven economy.

India's growing rural economy and agricultural resurgence are driving new demand for infrastructure, technology, and consumption across Bharat's heartland. India's manufacturing surge and export growth are transforming India into a global production powerhouse, leveraging scale, competitiveness, and rising integration into global supply chains.

Together, these factors form the backbone of India's structural growth narrative, enabling resilience in the face of global volatility and offering long-term upside for both domestic and international investors.

2.5. India – Consumption Trends for Key Commodities

1. Cement

India is the second-largest cement producer globally. India's cement consumption stood at 445 MMT in FY24 and is projected to rise to 670 MMT by 2030. Consumption is fueled by infrastructure development, urban housing, rural road projects, and the government's push under schemes such as PM Awas Yojana, Bharatmala, and the Smart Cities Mission. Growth is expected to continue at a 7–8% CAGR, supported by the recovery in construction and real estate.

2. Fertilizers

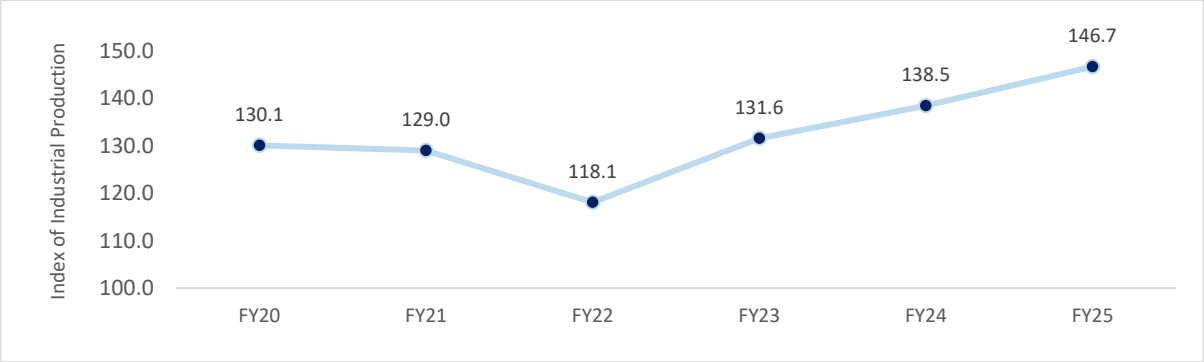
India consumes over 60 million tonnes of fertilizers annually (including Urea, DAP, and MOP). Urea dominates, accounting for ~55% of total consumption. Fertilizer demand is seasonal and monsoon-dependent but remains structurally high due to India's large agricultural base. The government is promoting the balanced application of nutrients, neem-coated urea, and nano-fertilizers to improve efficiency and reduce subsidy costs. The Indian fertilizer market was valued at INR 942.1 billion in 2023 and is projected to grow to about INR 1,380 billion by 2032, registering a CAGR of ~4.2% during 2024–2032, driven by rising agricultural demand and sustained government support.

3. Chemicals

India's chemical consumption spans petrochemicals, agrochemicals, specialty chemicals, and industrial chemicals, with the overall sector valued at USD 220–230 billion. Consumption growth is driven by agriculture, textiles, automotive, and FMCG. India is emerging as a global alternative to China in chemical supply chains, with specialty chemicals growing at 10–12% CAGR, supported by domestic demand and export potential.

2.6. Industrial Activity Growth – Increase in IIP

Exhibit 2.3: Index of Industrial Production (IIP), India, FY20 to FY2025



Source: MOSPI – India, Frost & Sullivan.

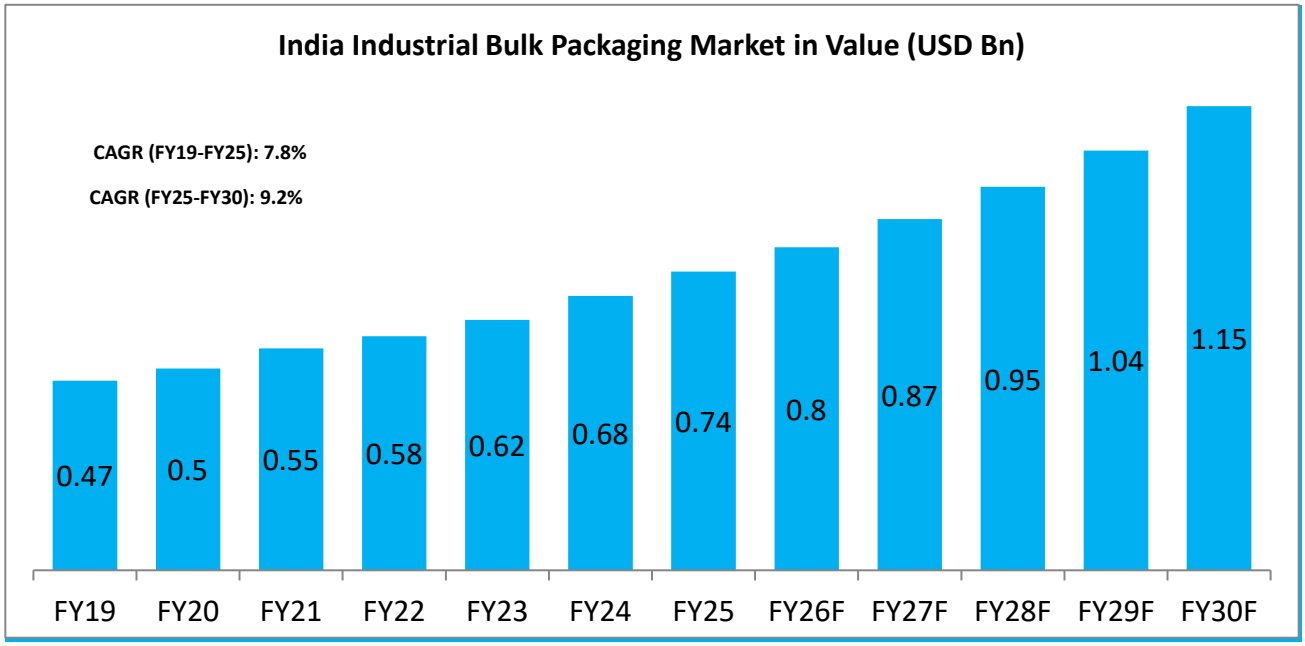
Between FY2019-20 and FY2024-25, India's IIP grew at a steady phase, driven by initiatives like the PLI scheme, Make in India, and Atmanirbhar Bharat, which boosted domestic manufacturing and innovation. Key sectors such as automotive, electronics, and pharmaceuticals have thrived on strong consumer demand and export opportunities, highlighting India’s evolving industrial ecosystem and its growing role in global manufacturing and trade. Macro factors like GDP growth, inflation, and landmark policies, along with micro drivers such as skilled labor, infrastructure, and technological advancements, have bolstered industrial activity. Improved logistics and targeted resource policies further strengthen India’s growth-oriented industrial framework, paving the way for sustained economic expansion. At the micro level**,** factors such as capacity expansion in core sectors (like chemicals, cement, and auto components), rising private capex, and increasing adoption of automation and Industry 4.0 practices are significantly boosting production efficiency.

2.7. India – Industrial Bulk Packaging Market

India’s economy is poised for robust growth in the coming years, supported by rising consumer spending and rapid urbanization. These macroeconomic tailwinds are expected to drive strong demand across a wide range of sectors, including chemicals, pharmaceuticals, food and beverages, and building and construction. This, in turn, will fuel the need for efficient and scalable packaging solutions.

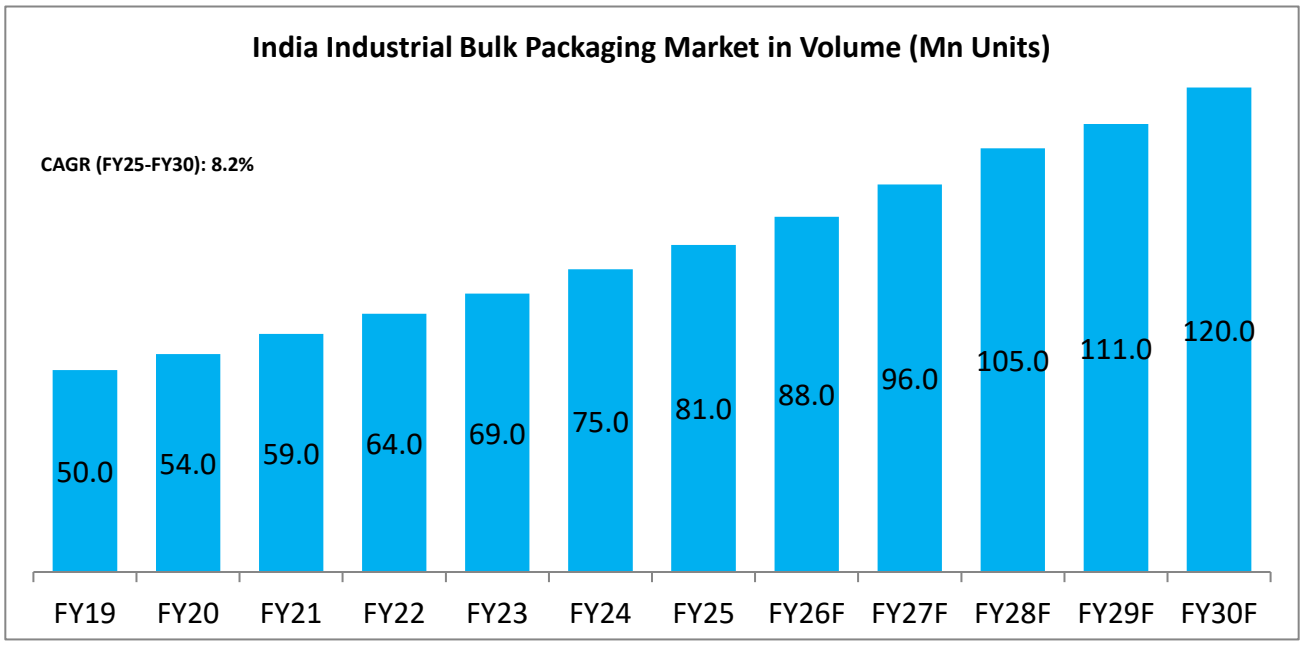
Notably, significant capacity expansions in specialty chemicals, industrial chemicals, and petrochemicals are set to open new avenues for growth in the industrial bulk packaging market. Within this space, Flexible Intermediate Bulk Containers (FIBCs) account for approximately 60% of the market by unit volume. The FIBC segment is expected to outpace traditional formats such as steel and plastic drums, driven by a clear shift in industry preference toward packaging solutions that offer greater cost efficiency, handling flexibility, and logistical advantages. As industries seek optimized packaging for bulk handling and export operations, FIBCs are increasingly emerging as the preferred choice.

Exhibit 2.4: Industrial Bulk Packaging Market, India, Revenue Forecast, FY2019 to FY2030F



Source: Frost & Sullivan Analysis

Exhibit 2.5: Industrial Bulk Packaging Market, India, Volume Forecast, FY2019 to FY2030F

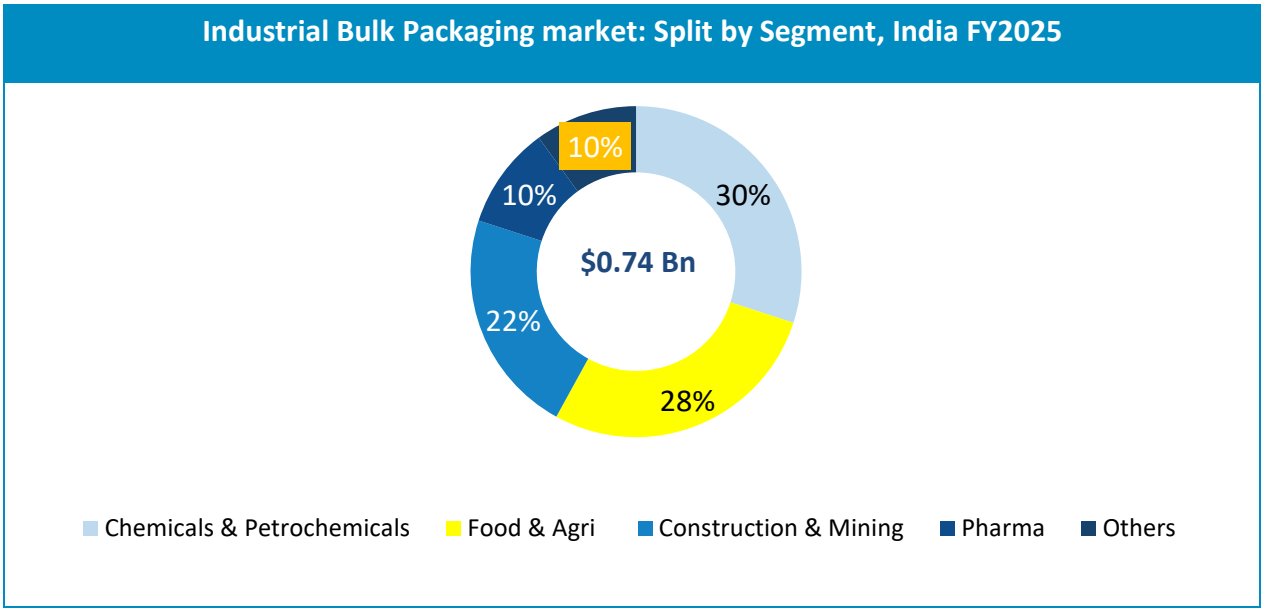


Source: Frost & Sullivan Analysis

The Indian Industrial Bulk Packaging market has witnessed steady growth over the past decade and is positioned for substantial expansion through FY30. In FY19, the market was valued at approximately USD 470 million, with a volume of around 50 million units. As of FY24, the market has grown to an estimated USD 680 million, driven by increasing demand from the chemical, cement, fertilizer, and food processing industries, as well as rising exports of agricultural and industrial goods. The volume for FY24 is estimated at ~75 million units. India remains one of the world's largest producers and exporters of FIBCs, accounting for over 25% of global FIBC export volumes, and continues to strengthen its position in the worldwide packaging supply chain.

Looking ahead, the market is expected to expand at a CAGR of 7.8%, reaching USD 740 million in FY25 and crossing USD 1.15 billion by FY30, with volumes likely to reach 120 million units. Increased industrial activity, innovative manufacturing practices, infrastructure push, and the need for safer, certified, and food-grade bulk handling solutions will drive growth. The government's focus on manufacturing incentives (like PLI schemes), rising domestic capex, and growing emphasis on sustainability and recyclable materials are also supporting premiumization in packaging. Overall, India's FIBC sector is set to play a critical role in supporting the country's broader industrial and export-led growth, with both volume and value expected to scale significantly over the next six to seven years.

Exhibit 2.6: Industrial Bulk Packaging Market, India, Value Split



The FIBC end-user mix in India is dominated by the chemicals sector, closely followed by food & agri, each commanding a significant share by value and volume. Pharma presents a high-value niche, while construction/mining drives volume growth. With a rising preference for FIBCs over drums or rigid packaging, due to benefits in cost-efficiency, flexibility, and logistics, all these sectors are expected to continue favoring bulk packaging solutions, especially those that meet food-grade, UN safety, and sustainability standards.

2.8. Tailwinds for Growth of Manufacturing in India

In FY2024–25 , India's merchandise exports remained steady at approximately **USD 437.7 billion**, with non-petroleum exports reaching a historic **USD 374.3 billion**, reflecting continued export resilience amid global uncertainties It is well on its way to becoming a global manufacturing hub with the potential to export goods worth USD 1 trillion by 2030. The manufacturing sector plays a significant role in the Indian economy, accounting for 17% of GDP and employing more than 62 million people in FY24. The Indian government plans to increase the share of manufacturing in the economy to 25% by 2047 through the implementation of various programs and policies. The government of India has undertaken various steps to promote the manufacturing sector and to boost domestic and foreign investments in India. These include the introduction of Goods and Services Tax, reduction in corporate tax, interventions to improve ease of doing business, FDI policy reforms, measures for reduction in compliance burden, policy measures to boost domestic manufacturing through public procurement orders, Phased Manufacturing Programme (PMP), to name a few.

Keeping in view India's vision of becoming 'Atmanirbhar', PLI schemes for 14 key sectors/product baskets with an incentive outlay of INR 2,130 billion are under implementation to enhance India's manufacturing capabilities and exports. PLI scheme across these key specific sectors started to make Indian manufacturers globally competitive, attract investment in the areas of core competency and cutting-edge technology, ensure efficiencies, create economies of scale, enhance exports, and make India an integral part of the global value chain.

The Phased Manufacturing Program (PMP) is a Government of India initiative to boost domestic manufacturing. It works by increasing import duties on finished goods while keeping lower duties on components, encouraging companies to assemble and manufacture parts locally. Implemented in phases, PMP gradually promotes higher local value addition. It has helped India become a major mobile phone manufacturing hub, attracted global investments, and generated employment. However, challenges remain in localizing complex components and building supporting infrastructure. Key aspects of PMP include import substitution, phased duty reductions, and a focus on technology and innovation. Incentives for domestic manufacturers include tax breaks, subsidies, and reduced regulatory burdens. The program can be expanded to other sectors based on government priorities and industry needs. Benefits of PMP include job creation, attraction of investments, and enhanced export potential. It is part of the Indian government's efforts to support the "Make in India" movement, aiming to make India a global manufacturing hub.

The Indian manufacturing sector in FY25 showcased resilience and adaptability, leveraging domestic demand, export opportunities, and government support. With ongoing investments in technology, sustainability, and infrastructure, the sector is poised for continued growth in the coming years.

India has emerged as a significant player among the world's leading manufacturing economies, driven by its strategic reforms, skilled workforce, and strong domestic demand. The following factors contribute to India's competitiveness:

1. Global Ranking and Growth Potential

- India is currently the fifth-largest manufacturing economy globally and is rapidly closing the gap with developed economies.
- The Make in India initiative, launched in 2014, has positioned the country as a global manufacturing hub by attracting foreign investments and promoting exports.
- According to the Global Manufacturing Competitiveness Index, India is projected to rank among the top three manufacturing destinations by the end of this decade, alongside China and the United States.

2. Cost Competitiveness

- India offers low labor costs, which are significantly lower than in countries like China and Mexico, making it an attractive destination for labour-intensive manufacturing industries.

- Despite rising input costs, India remains cost-competitive in sectors like textiles, electronics, and automotive.

3. Strong Domestic Market

- With a population of over 1.4 billion, India has a large consumer base, providing robust demand for domestically manufactured goods.
- Rising middle-class incomes and increasing urbanization have driven demand for durable goods, electronics, and automobiles.

4. Skilled Workforce and Technological Advancements

- India's large pool of skilled and semi-skilled workers is a key competitive advantage.
- Increasing adoption of Industry 4.0 technologies, such as IoT, AI, and robotics, has enhanced productivity and quality in manufacturing.
- Collaboration between the government and private sector for workforce upskilling ensures alignment with future industry needs.

5. Sectoral Strengths

- **Electronics Manufacturing**: India is now one of the world's leading mobile phone manufacturing hubs.
- **Automotive Industry**: India ranks as the fourth-largest automobile manufacturer globally, with a growing focus on electric vehicles (EVs).
- **Renewable Energy Components**: India is becoming a key player in the production of solar panels, wind turbines, and green hydrogen technologies.
- **Pharmaceuticals**: India is recognized as the "Pharmacy of the World," being the largest global supplier of generic drugs.
- **Aerospace & Defense:** India is becoming a key defense manufacturing hub with growing capabilities in drones, missiles, aircraft parts, and military electronics, supported by Make in India and rising exports.
- **Agriculture & Agri-Tech:** India is advancing in precision farming and agri-tech, and is a major producer of tractors, agrochemicals, and farm machinery

6. Integration with Global Value Chains (GVCs)

- India's focus on free trade agreements (FTAs) and regional partnerships has improved its integration with global supply chains.

The emphasis on reducing logistics costs through infrastructure projects like Gati Shakti and the Dedicated Freight Corridors (DFCs) has improved efficiency and global competitiveness.

2.9. Other Manufacturing Drivers, Government Schemes Focus on Textiles

Union Budget 2026-2027

Union Budget 2026–27 The Union Budget 2026–27 continued its emphasis on the textile sector, with a stronger pivot toward an integrated, fibre-to-fashion policy framework:

- The Ministry of Textiles' allocation stood at approximately ₹5,279.01 crore for FY27, marginally lower than the FY26 revised estimate of ₹5,766.68 crore in FY26, but broadly stable compared to the FY26 budget estimate.
- A new Integrated Programme for the Textile Sector was introduced with five sub-components, including a National Fibre Scheme aimed at achieving self-reliance across the fibre spectrum, supporting natural fibres such as silk, wool and jute, man-made fibres, and new-age fibres
- A Textile Expansion and Employment Scheme was proposed to modernise traditional clusters through capital support for machinery, technology upgradation and common testing and certification facilities, alongside a National Handloom and Handicraft Programme and a Tex-Eco Initiative for sustainable textiles
- On the export side, the Budget extended the export obligation period from 6 months to 12 months for exporters of textile garments, leather garments, leather or synthetic footwear and other leather products manufactured using duty-free imported inputs
- A dedicated ₹10,000 crore SME Growth Fund was introduced to incentivize enterprise growth, while the India-EU FTA offers zero duty access in textiles and clothing, covering all tariff lines, reducing tariffs by up to 12%, expected to benefit MMF and technical textiles exports.

Government Schemes:

The Government of India ("GoI") has introduced several initiatives and incentives, making the industry favorable for growth. These include the Amended Technology Upgradation Fund Scheme ("ATUFS"), under the Ministry of Textiles, which aims to facilitate employment, investment, quality, productivity, as well as import substitution in the textile industry while also indirectly promoting investments in the manufacturing of machinery for textiles, including technical textiles.

State Schemes

The following states have been actively promoting technical textiles through their textile policies.

Exhibit 2.7: Statewide Textile Policies – Sector Promotion

PARTICULARS	Gujarat Textile Policy 2024	West Bengal Textile Incentive Scheme, 2022	Bihar Textile & Leather Policy 2022
Operative period	Effective from Oct' 24 to Sept 29	Effective from 13th December 2022 for 5 years	Effective from 26th May'22
LAND SUBSIDY		100% waiver of fees for conversion and mutation of the land	
STAMP DUTY, TRANSFER DUTY, REGISTRATION FEE		100 % stamp duty exemption	100 % stamp duty exemption
CAPITAL SUBSIDY	20% to 35% subsidy based on the category of area in which the unit is established, subject to a maximum of 100 Cr. To be disbursed in 5 equal instalments to only units availing Term Loan.	10% capital subsidy subject to a maximum of Rs 10 Crores	15% of plant & machinery to be paid in 5 years for equal installments (max. 10 crores)
ENERGY, WATER, ENVIRONMENT PROTECTION ETC. INFRASTRCUTURE		25% for the Water treatment plant, max. Rs 1.5 Cr	
INTEREST SUBSIDY	5% to 7% interest subsidy for 6-8 years based on the category of location, maximum 2-3% of the eligible fixed capital Investment. *Industrial unit shall have to bear a		Max. up to 10% (12% for Micro, small) up to 5 years, subject to max. 50% of FCI or 20 crores whichever is less.

	min. of 2% interest levied on Term Loan.		
POWER SUBSIDY	Rs. 1 per unit for 5 years	Rs 1.5 per unit, max. Rs. 1 cr per annum for 5 years	Rs.2/- per unit for 5 years subject to category of enterprises ranging from 2.5 lakhs to 80 lakhs per year
ELECTRICITY DUTY REBATE		100 % waiver of electricity duty for 5 years, max. Rs 1 crore per year	100% exemption from payment of Electricity Duty for 10 years from the date of commencement of commercial production
TRANSPORT/ LOGISTICS SUBSIDY			30% reimbursement on freight charges from the unit to the port for the first 5 years
SKILL DEVELOPMENT			INR 20,000 per employee or BSDM rates or on actual, whichever is low, only once for the domicile of Bihar
PAYROLL ASSISTANCE / EMPLOYMENT GENERATION SUBSIDY	Rs 3,000 per female worker and Rs 2,000 per male worker per month for a period of 5 years.		
TAX RELATED INCENTIVES			100% reimbursement of SGST for 5 years

PARTICULARS	Madhya Pradesh Industrial Promotion Policy 2025	UP Textile and Garmenting Policy 2022	Maharashtra Textile Policy 2023-28
Operative period	Effective from 18th Feb'25 for 5 years	Effective from 17th Oct'22 for 5 years.	Effective from 2nd June'23 till 31st March 28
LAND SUBSIDY		15%-25% of land cost will be reimbursed on the purchase of land developed by the government. agencies (limited to 10% of total project cost) only when the unit starts commercial production within five years of buying the land.	
STAMP DUTY, TRANSFER DUTY, REGISTRATION FEE		100% exemption of stamp duty. (In Gautam Budh Nagar district, 75%	
CAPITAL SUBSIDY	Subsidy of 10% to 40%, subject to a maximum of 200 crores to be paid in 7 equal annual instalments for large units	Up to 25% Capital subsidy on Investment and Employment Generated criteria, Max 100 Cr	25% to 55% of the Eligible Amount, depending on the nature of the enterprise and the zone, in installments, with an additional 5% penalty. For SC/ST/Minority, 5% addl. For units being run by women
ENERGY, WATER, ENVIRONMENT PROTECTION, ETC. INFRASTRUCTURE	50% assistance for developing power, water, drainage, and infrastructure up to ₹5 Crore if it acquires private land or gets undeveloped Government land for setting up the unit.	50% for self-use infra like (i) Roads (ii) Drainage & Water Supply (ii) Power Supply Line/transformer capped at 3 cr	

INTEREST SUBSIDY	5% on term loan taken for plant & machinery for 5 years, max up to 50 crores	60% of the annual interest paid by the unit to the institutions for plant and machinery reimbursed for a maximum period of 7 years (max 1.5 Cr per year)	
POWER SUBSIDY			Subsidy of Rs. 2 per unit for 2 years with a cap of 40 lakhs per month per unit
ELECTRICITY DUTY REBATE		100% exemption from electricity duty will be given to the new textile and garmenting units for 10 years	
TRANSPORT/ LOGISTICS SUBSIDY		75% for the first 2 years; 50% for the next 2 years; 25% in the fifth year	
PAYROLL ASSISTANCE / EMPLOYMENT GENERATION SUBSIDY	Units providing employment to Persons with Disabilities (minimum 5% of total workforce) will be eligible for following incentives: 1.100% reimbursement of skill development expenses upto ₹5,000/- per employee for 3 months from date of joining. 2.Medical insurance premium reimbursement for 5 years	INR 3,200/- per worker per month for 5 Years	

Production Linked Incentive Schemes:

Over the last two years, the government has introduced manufacturing incentives for more than 13 categories, including electronics, auto components, semiconductors, pharmaceuticals, textiles, and

drone manufacturing, among others. Respective schemes offer 4%-6% incentives on incremental turnover over 5 years for selected companies.

Textile PLI Scheme:

The PLI scheme was notified for textile products, including MMF4 Apparel, 14 categories of MMF Fabrics, and 10 categories of Products of Technical Textiles in September 2021. The scheme aims to boost India's manufacturing and export capabilities in the sector with a financial outlay of INR 10,683 crores over five years. MMF fabrics covered under the scheme include woven fabrics containing nylon, polyester, and other manmade fibers. Technical textiles covered under the scheme include defense textiles such as bulletproof vests, fighter aircraft, and submarine clothing and tents, mobile textiles such as safety airbags, tyre cords, and protective textiles such as personal protective equipment and fire-retardant fabrics. Also incentivized is the production of smart textiles used in active devices for medical, defense, and special purposes.

To further incentivize the sector, import duty on cotton was also discontinued. The PLI scheme is divided into two categories. Under Part I, the minimum required investment is Rs. 300 crores, while for Part II, the minimum investment requirement is Rs. 100 crores.

Extended Producer Responsibility (EPR) Guidelines:

The government notified guidelines on Extended Producer Responsibility on plastic packaging under the Plastic Waste Management Rules, 2016, in February 2022. The guidelines, which came into immediate effect in February 2022, are aimed at consolidating the circular economy of plastic packaging waste, promoting the creation of alternatives to plastics, and outlining future steps towards sustainable plastic packaging. The guidelines pertain to producers and importers of plastics packaging and brand owners, including online platforms and supermarkets, which are not micro and small enterprises as per the criteria of the Ministry of Micro, Small and Medium Enterprises.

EPR covers 4 plastic packing categories as defined below:

(1) Category I: Rigid plastic packaging
(2) Category II: Flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic), plastic sheets or like and covers made of plastic sheet, carry bags, plastic sachet or pouches.
(3) Category III: Multi-layered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic)
(4) Plastic sheet or like used for packaging as well as carry bags made of compostable plastics.

Exhibit 2.8: Minimum level of recycling (excluding end of life disposal) of plastic packaging waste (% of Extended Producer Responsibility Target1)

[4] Man-made Fibers

Category	2024-25	2025-26	2026-27	2027-28 and beyond
I	50	60	70	80
II	30	40	50	60
III	30	40	50	60
IV	50	60	70	80

1 In the case of Category IV plastic packaging category (plastic sheet or like used for packaging and carry bags made of compostable plastics), the minimum level of recycling means processing plastic packaging waste for composting through industrial composting facilities.

Source: The Gazette of India: Extraordinary PART II—Section 3—Sub-section (i) Published February 16th, 2022;

Exhibit 2.9: Mandatory use of recycled plastic in plastic packaging (% of plastic manufactured for the year)

Category	2024-25	2025-26	2026-27	2027-28 and beyond
I	30	40	50	60
II	10	10	20	20
III	5	5	10	10

1 In cases, where it is not possible to meet the obligation in respect of recycled plastic content on account of statutory requirements, the exemption will be granted by the Central Pollution Control Board on a case-to-case basis. However, in such cases, the Producers, Importers & Brand-Owners will have to fulfill their obligation to use recycled content (in quantitative terms) through purchase of certificate of equivalent quantity from such Producers, Importers & Brand Owners who have used recycled content over their obligation. Central Pollution Control Board will develop mechanism for such exchange on the centralized online portal.

Source: The Gazette of India: Extraordinary PART II—Section 3—Sub-section (i) Published February 16th, 2022;

2.10. Other Manufacturing Drivers, Government Schemes Focus on Textiles

. As India strengthens its position as a global manufacturing hub, driven by the Government's flagship Make in India and allied initiatives such as PLI schemes, the country has continued to record steady foreign direct investment inflows into the manufacturing sector. This momentum has accelerated a broad-based transformation of India's supply chain ecosystem, with companies increasingly reconfiguring operations toward scale, resilience, and global competitiveness. The shift has intensified the need for systematic upskilling and modernization, particularly across industrial infrastructure, automation, logistics, and energy-efficient manufacturing systems, to support higher-value production and export-oriented growth. In response, the domestic industrial machinery manufacturing sector has witnessed a sharp uptick, with the market size projected to grow at a healthy CAGR going forward. This growth is being driven by rising domestic demand across automotive, electronics, textile, and FMCG sectors, as well as increased export potential, positioning Indian industrial machinery manufacturers as vital enablers of the country's manufacturing-led growth ambitions

Prominent industrial machinery manufacturers in India, spanning diverse sectors such as plastic processing, textile machinery, and precision CNC equipment, include Lohia Corp Limited, LMW Limited, Mamata Machinery Limited, Rajoo Engineers Limited, Jyoti CNC Automation Limited, and Windsor Machines Limited.

Global Technical Textile Industry

3.1. Industry Overview

Definition:

Technical textiles are high-performance fabrics engineered for functional applications across industries including automotive, healthcare, construction, and agricultural industries. Unlike conventional textiles, they are designed primarily for performance attributes like strength, durability and resistance to extreme conditions.

Technical textiles are used individually to satisfy specific functions, such as fire-retardant fabric for uniforms of firemen and coated fabric to be used as awnings. As a component or part of another product, they are used to enhance the strength, performance, or other functional properties of that product.

Technical textiles have been slowly but steadily gaining ground due to reasons such as functional requirements, health, and safety, cost-effectiveness, durability, high strength, lightweight, versatility, customization, user-friendliness, eco-friendliness, logistical convenience, etc. Unlike conventional textiles used traditionally for clothing or furnishing, technical textiles are used basically on account of their specific physical and functional properties and mostly by other user industries. Depending on the product characteristics, functional requirements, and end-use applications, the highly diversified range of technical textiles is grouped into 12 segments.

They are manufactured using natural as well as man-made fibers such as Nomex, Kevlar, Spandex, Twaron that exhibit enhanced functional properties such as higher tenacity, excellent insulation, improved thermal resistance, etc. Taking cognizance of technological advancements, countries are aligning their industries to accommodate technical textiles. This shift is evident in India's textile sector as well, moving from traditional textiles to technical textiles.

3.2. Technical Textile Classification

The technical textile industry is classified into 12 broader categories, which are summarized below:

Segment	Applications	Key Products/Uses
Agrotech	Agriculture, horticulture, fisheries, and forestry	Shade nets, crop covers, mulch mats, fishing nets, pond liners, animal protection fabrics
Buildtech	Building and construction	Tarpaulins, awnings, scaffolding nets, architectural membranes, wall coverings, and acoustic fabrics

Clothtech	Functional components in clothing and footwear	Shoelaces, interlinings, zippers, elastic fabrics, and umbrella cloth
Geotech	Soil reinforcement, separation, filtration, and erosion control	Geogrids, Geonets, Geocomposites used in roads, railways, embankments, waterworks
Hometech	Household textiles and furniture components	Fiberfill, mattress components, pillow stuffings, carpet backing, stuffed toys, blinds
Indutech	Industrial processing and support systems	Filters, conveyor belts, drive belts, printer ribbons, bolting cloth, paper-making fabrics
Meditech	Medical and hygiene applications	Diapers, sanitary napkins, PPE kits, masks, surgical gowns, implants
Mobiltech	Transportation sector – land, air, water, and space	Seat belts, airbags, helmets, seat upholstery, airline disposables, tire cords
Oekotech	Environmental protection	Erosion control fabrics, air and water purification media, waste recycling fabrics
Packtech	Packaging of industrial and food grains products	Woven sacks, FIBCs, protective packaging for agricultural and industrial use
Protech	Protection and safety for personnel and assets	Fire-retardant suits, bulletproof vests, protective gloves, military uniforms
Sportech	Sports and recreational activities	Artificial turfs, parachute fabrics, racquets, sports nets, balloon fabrics, sailcloths, fishing rods

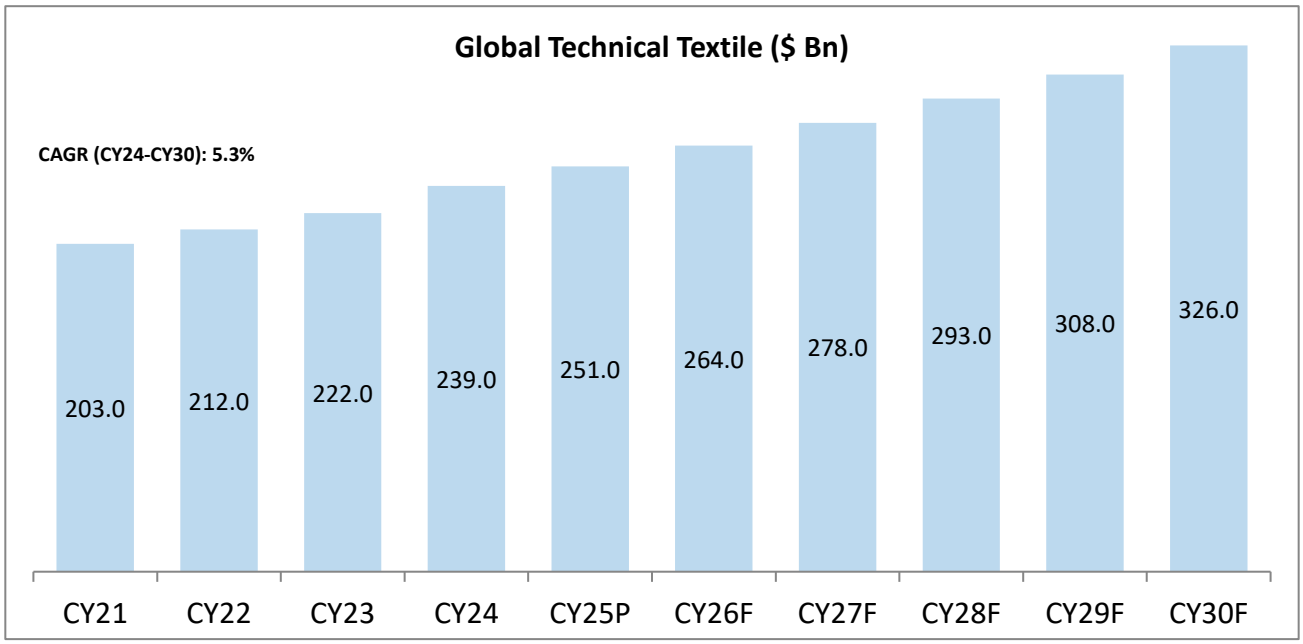
3.3. Global Technical Textile Market – Overview

The global technical textile market is a rapidly expanding segment of the textile industry, driven by the demand for high-performance, functional textiles used across industrial and non-consumer applications. Unlike conventional textiles focused on aesthetics, technical textiles are engineered for

specific uses, such as durability, strength, filtration, insulation, and resistance to environmental factors.

The Global technical textile market is estimated at USD 239.0 Bn in CY2024 and is expected to reach USD 326.0 Bn by CY2030 at a CAGR of 5.3% during the forecast period.

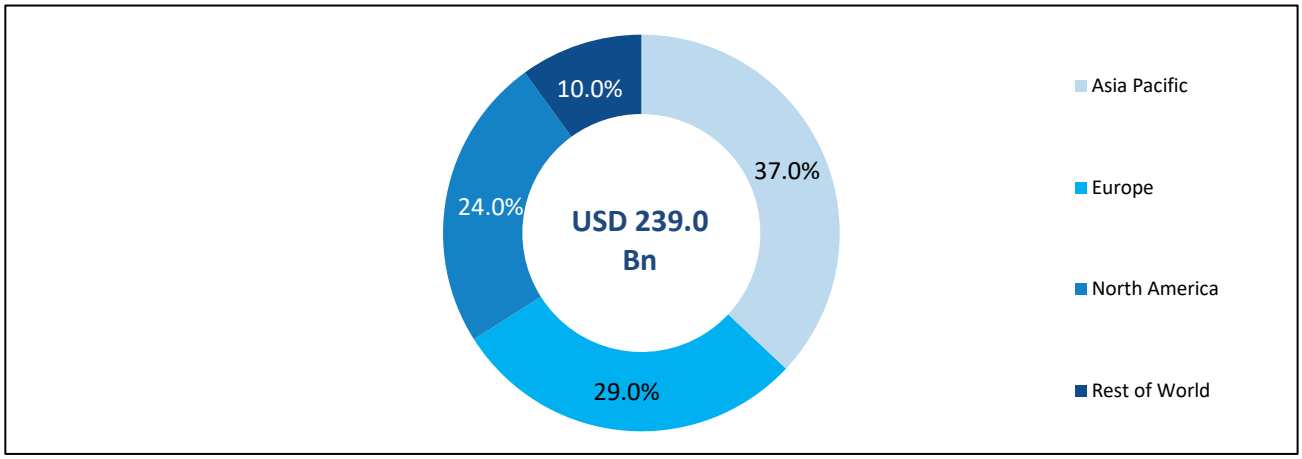
Exhibit 3.1: Global Technical Textile, Revenue Forecast, CY21-CY30



Source: Frost & Sullivan Analysis

The global technical textile market is exhibiting a strong and consistent growth trajectory, with the market size expanding from USD 239 billion in 2024 to a projected USD 326 billion by 2030. This steady rise reflects a compound annual growth rate of approximately 5.3%, driven by increasing demand across various industries, including automotive, healthcare, infrastructure, agriculture, and packaging. Notably, the pace of growth accelerates from calendar year 2024 onward, indicating a shift in the global economy toward performance-based, functional materials and the greater adoption of advanced textiles in industrial and consumer applications. The upward trend also signals the rising importance of technical textiles in supporting sustainability goals, product innovation, and supply chain resilience. By CY2030, the market is expected to firmly establish itself as a mainstream component of global industrial output, underpinned by evolving applications and strategic policy support in key economies.

Exhibit 3.2: Global Technical Textile Market, Split by Region, CY24



The Asia-Pacific region accounts for the largest share of the technical textile market, at around USD 88.2 billion in 2024, and is expected to grow at a rate of 6.2% until 2029. The European technical textile market size is estimated to be around USD 69.0 billion in 2024 and is expected to grow at a CAGR of 5.1%. The North American market is estimated to be around USD 57.5 billion in 2024 and is expected to grow at a CAGR of 4.3%. The rest of the world, consisting of Latin America, the Middle East, and Africa, is estimated to be around USD 24.3 Bn in 2024 and expected to grow at a CAGR of 4.0% till 2029.

Asia-Pacific, especially China and India, leads with the fastest growth, driven by infrastructure investment, domestic auto production, and textile manufacturing incentives. Developed markets in North America and Europe are evolving via regulatory mandates, sustainability investment, and advanced manufacturing strategies. Europe holds the second-largest share, anchored by stringent sustainability regulations, circular economy initiatives, and innovation in smart textiles and high-performance materials.

3.4. Global Woven Raffia Contribution to Technical Textile Market

The raffia industry plays a pivotal role in the global technical textile market, contributing significantly across multiple end-use segments, including Pack Tech, Agro Tech, Build Tech, and Geo Tech. Made primarily from woven polypropylene (PP) and polyethylene (PE), raffia fabrics are renowned for their high strength, flexibility, and cost-effectiveness, making them ideal for large-scale applications such as bulk packaging, shading nets, ground covers, scaffolding wraps, and geotextiles. As of 2024, the global woven raffia market is valued at approximately USD 69.4 billion and is expected to reach USD 100.3 billion by 2030, growing at a CAGR of 6.3%. This growth is driven by increasing demand for durable and reusable packaging in agriculture, infrastructure development, and industrial logistics. At a global level, raffia contributed around 32.8% to the overall technical textile market in 2024,

making it one of the most significant and volume-intensive segments. The segment's expansion is further supported by rising export demand from manufacturing hubs such as India, China, and Vietnam, as well as the growing substitution of traditional materials like jute and paper. However, the industry is also beginning to adapt to sustainability expectations, with efforts underway to develop recycled and biodegradable raffia solutions. Overall, the raffia segment continues to anchor global technical textile consumption through its broad industrial relevance and evolving innovations.

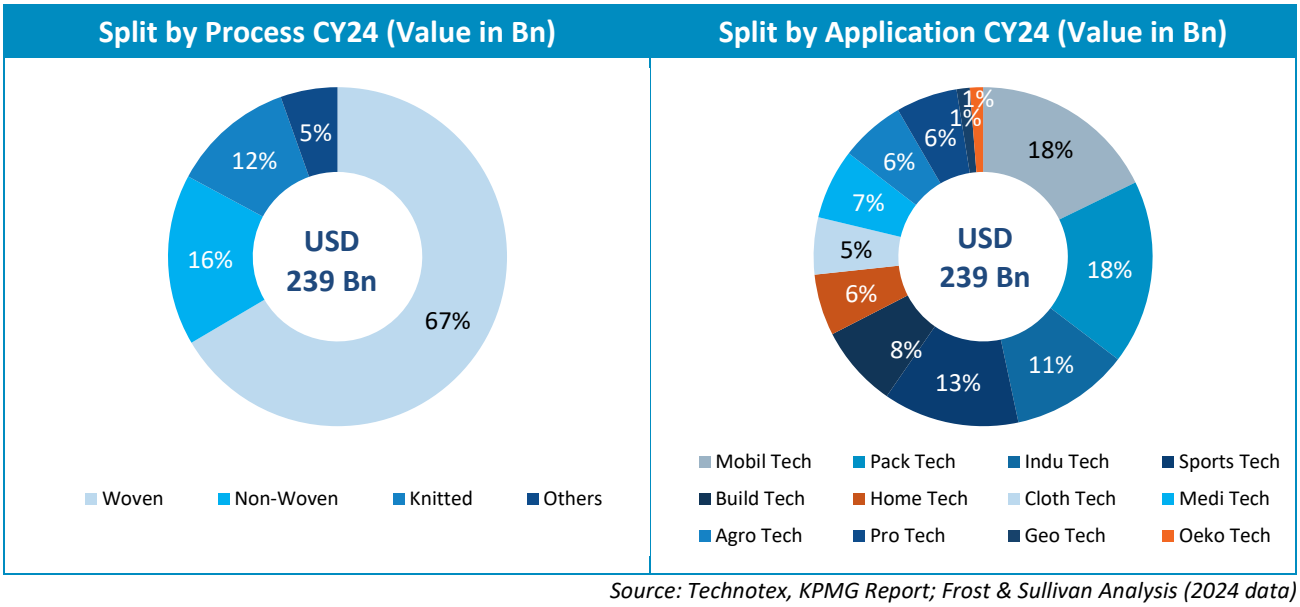
3.5. Global Technical Textile Market – Classification by Type and Applications

At the global level, Mobiltech, Packtech, Indutech, and Sportstech are the four segments that are likely to grow at a relatively higher rate (CAGR > 5%) in terms of the value of technical textiles consumption during the period 2024-29. Mobiltech, Indutech, Packtech, Buildtech, and Sportstech will constitute a significant share of the global market's value for technical textiles.

The global technical textile sector by process is led by woven with 66.5% market share by value, followed by non-woven with 16.3% share, knitted with 11.7% share, and others with 5.5%. The global technical textile market by application is led by Mobil tech with 17.8% market share, Pack tech with 17.6%, and sports tech with 13.0%, while the rest is under the remaining 51.6%.

Woven textiles remain dominant due to their strength and durability, especially in heavy-duty industrial applications, while non-wovens are rapidly gaining traction in medical, hygiene, and disposable products owing to their ease of production and cost-effectiveness. Knitted textiles are also growing steadily, supported by rising usage in sportswear, wearable devices, and medical compression garments.

Exhibit 3.3: Global Technical Textile Market, Split by Process and Application, CY24



Source: Technotex, KPMG Report; Frost & Sullivan Analysis (2024 data)

Woven textiles remain the largest and fastest-growing segment, driven by their widespread use in robust applications such as geotextiles, agrotextiles, and industrial packaging.

Non-woven textiles have gained significant traction, especially after a notable surge in demand for medical and hygiene products and continue to maintain healthy momentum.

Knitted textiles are showing a gradual recovery and are expected to grow steadily, supported by demand in protective wear, sportswear, and medical garments. The overall trend indicates strong, multi-format expansion supported by innovation, diverse industrial demand, and functional performance requirements.

Exhibit 3.4: Global Technical Textile Market, Split by Process, CY21-CY30 ($Bn)

Process	CY21	CY22	CY23	CY24	CY25P	CY26F	CY27F	CY28F	CY29F	CY30F	CAGR (CY25-30)
Woven	136.0	143.0	151.0	159.0	167.2	176.1	185.8	196.8	208.6	221.0	5.7%
Non-woven	32.0	33.0	34.0	39.0	41.0	43.0	45.0	47.0	48.5	51.7	4.7%
Knitted	23.0	24.0	25.0	28.0	29.3	30.8	32.5	34.0	35.2	37.0	4.8%
Others	12.0	12.0	12.0	13.0	13.5	14.1	14.7	15.2	15.7	16.3	3.8%
Total	**203.0**	**212.0**	**222.0**	**239.0**	**251.0**	**264.0**	**278.0**	**293.0**	**308.0**	**326.0**	**5.4%**

Source: Frost & Sullivan Analysis

Exhibit 3.5: Global Technical Textile Market, Split by Application, CY21-CY30 ($Bn)

Process	CY21	CY22	CY23	CY24	CY25P	CY26F	CY27F	CY28F	CY29F	CY30F	CAGR (CY25-30)
Mobil Tech	35.0	37.0	39.0	42.5	44.2	47.2	49.4	53.0	56.4	59.4	6.1%
Pack Tech	24.0	25.0	26.0	42.0	44.0	47.5	49.8	53.3	56.5	59.7	6.3%
Indu Tech	28.0	29.0	30.0	27.0	29.0	29.9	31.5	33.5	35.5	37.1	5.0%
Sports Tech	15.0	16.0	17.0	31.0	32.0	33.5	36.5	38.3	40.2	42.2	5.7%
Build Tech	12.0	13.0	13.0	18.7	20.0	20.6	21.3	22.3	23.5	24.8	4.4%
Home Tech	12.0	12.0	13.0	14.0	14.4	15.0	16.0	16.5	17.0	18.0	4.6%
Cloth Tech	14.0	14.0	15.0	13.0	13.8	14.2	15.2	15.6	16.0	17.5	4.9%
Medi Tech	12.0	12.0	13.0	16.0	17.0	18.0	19.0	19.2	20.0	21.1	4.4%
Agro Tech	12.0	13.0	14.0	14.8	15.5	16.2	16.7	18.0	18.7	20.0	5.2%
Pro Tech	35.2	37.0	38.0	14.0	14.8	15.4	15.7	16.2	16.8	17.8	3.8%
Geo Tech	2.0	2.0	2.0	3.0	3.1	3.2	3.4	3.5	3.7	4.2	6.3%
Oeko Tech	1.9	2.0	2.0	3.0	3.2	3.3	3.5	3.6	3.7	4.2	5.6%
Total	**203.0**	**212.0**	**222.0**	**239.0**	**251.0**	**264.0**	**278.0**	**293.0**	**308.0**	**326.0**	**5.4%**

Source: Frost & Sullivan Analysis

The technical textiles market is expanding steadily across diverse application areas, with packaging and mobility segments emerging as the leading contributors. Pack Tech has seen significant growth, driven by the rising demand for durable, reusable, and performance-based packaging solutions across the industrial and agricultural sectors. Mobil Tech, used extensively in automotive and transportation, continues to grow strongly due to increasing vehicle production, EV penetration, and emphasis on lightweight and safety components. Industrial textiles (Indu Tech) and Sport Tech are also key growth areas, with applications in filtration, insulation, and performance wear driving their relevance. Build Tech and Home Tech are showing steady momentum, supported by rising infrastructure projects and demand for functional home furnishings. Medi Tech and Agro Tech continue to expand, buoyed by healthcare modernization and the growing use of advanced materials in farming. Overall, the market shows a strong trend toward diversified end-use expansion, with packaging, transport, and industrial applications leading, and sustainability-focused segments gaining traction.

3.6. Key Growth Drivers in the Global Technical Textile Industry

Functionality, safety requirements, regulatory mandates, and continuous material innovation are driving the global technical textiles market. Countries such as China, the U.S., Germany, and India are emerging as key hubs for both production and export, fueled by rising industrial demand and strategic policy support. Governments in these countries are implementing targeted initiatives, such as India's PLI scheme, China's industrial upgrading programs, and the EU's Green Deal, to accelerate domestic manufacturing, promote innovation, and enhance global competitiveness in high-performance technical textiles. The key growth drivers are

1. Rising Demand from High-Performance Applications

Technical textiles are no longer niche; they have become mission-critical across sectors like automotive, aerospace, construction, medical, defense, and industrial safety. These applications demand materials that can withstand extreme conditions, be it high heat, chemical exposure, pressure, or microbial contamination. The use of technical textiles with properties such as flame retardancy, UV protection, antimicrobial resistance, and high tensile strength has become essential for product performance, safety, and compliance. Their ability to deliver both functionality and longevity is making them irreplaceable in modern engineering and design.

2. Infrastructure and Urban Development

With large-scale investments flowing into smart cities, transport corridors, highways, and urban renewal projects—particularly in emerging economies, the demand for geotextiles and buildtech fabrics is on the rise. These materials are used in road construction, drainage systems, soil

stabilization, embankments, and tunnel linings to enhance structural integrity and reduce maintenance costs. As governments integrate sustainability and resilience into their infrastructure planning, technical textiles are becoming foundational to the design of long-lasting, cost-effective civil engineering solutions.

3. Healthcare and Hygiene Expansion

The COVID-19 pandemic was a pivotal moment for Meditech textiles, catapulting them into mainstream awareness. Beyond PPE kits and surgical masks, the demand has extended to wound dressings, hospital linens, antimicrobial curtains, and even implantable textiles. As healthcare systems expand capacity and invest in infection control, the need for high-performance, disposable, and hygienic fabrics continues to rise. Moreover, the integration of smart medical textiles—capable of monitoring vitals or releasing medication—is gaining traction in chronic care and remote health monitoring.

4. Sustainability and Regulatory Compliance

Environmental sustainability is no longer optional—it's a regulatory and brand imperative. Global regulations around waste reduction, extended producer responsibility (EPR), and carbon footprint are driving manufacturers to innovate with biodegradable fibers, recycled content, and energy-efficient production methods. Technical textiles are now being designed not only for performance but also for end-of-life considerations—like recyclability and safe disposal. Brands are aligning product portfolios with circular economy goals, making sustainability a key competitive differentiator in the industry.

5. Automotive and Mobility Trends

With the global shift toward electric vehicles (EVs) and fuel efficiency, technical textiles play a central role in lightweighting and safety enhancement. Their use spans from airbags, seat belts, and headliners to sound insulation, battery separators, and interior panels. Lightweight technical fabrics contribute directly to energy savings and emissions reduction. As vehicle design becomes more intelligent and sustainable, the demand for multi-functional, lightweight, and recyclable textiles is poised to accelerate.

3.7. Threats and Challenges to the Global Technical Textile Industry

High Raw Material and Production Costs -Technical textiles often rely on specialty fibers, coatings, and composites (e.g., aramids, carbon fibers), which are expensive and subject to global commodity price volatility. Rising energy and logistics costs further strain margins, especially for small to mid-sized manufacturers.

Regulatory Complexities and Compliance Burden - The sector is governed by strict quality, safety, and environmental standards (e.g., REACH in the EU, FDA in the U.S.), increasing compliance costs. Delays in certifications (especially for Meditech, agrotech, and geotextiles) slow market entry for new players.

Lack of Skilled Workforce and Technical Expertise - A shortage of professionals with expertise in textile engineering, functional chemistry, and advanced machinery operation hinders innovation and scale-up, particularly in emerging economies.

Limited Consumer Awareness and Market Penetration - In developing regions, end-users are still unaware of the cost-benefit and long-term value of technical textiles, which limits adoption outside regulated sectors like pharma or defense.

Intense Global Competition and IP Concerns - Countries like China dominate mass production, creating pricing pressure globally. Protection of intellectual property is a growing concern for innovators due to rising imitation and weak enforcement in certain regions.

Fragmented Supply Chains and Geopolitical Disruptions - Global uncertainties, such as U.S.–China tensions and supply chain disruptions (e.g., Ukraine-Russia War, Red Sea crisis), create volatility in sourcing, exports, and machinery imports.

Environmental Concerns and Recycling Limitations - Most technical textiles are synthetic and not easily recyclable, raising concerns around environmental sustainability. There is growing pressure on manufacturers to develop eco-friendly, biodegradable alternatives, a costly and time-consuming R&D process.

Indian Technical Textile Industry

4.1. Indian Technical Textile Market – Overview

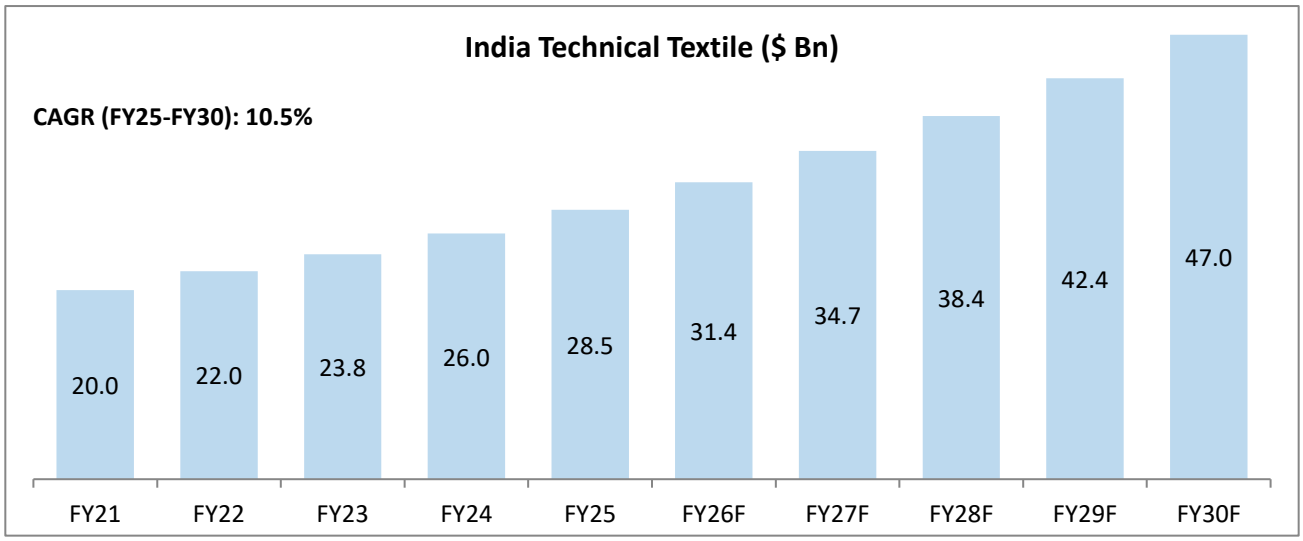
The Indian technical textile market is one of the fastest-growing segments in the country's textile ecosystem, driven by rising demand for functional, performance-based materials across industrial and infrastructure sectors. The Indian technical textile ecosystem includes raw material suppliers (fibers, resins, coatings), machinery and fabric manufacturers, product converters, and end-user industries like infrastructure, healthcare, automotive, etc. It is supported by R&D institutes, testing labs, and government bodies through policies like PLI and textile parks. Unlike traditional textiles, technical textiles in India are being adopted for their utility, such as strength, thermal resistance, filtration efficiency, and biocompatibility.

Once a peripheral segment reliant on imports, technical textiles have now become a central part of India's industrial vision. The Government of India aims to position the country as a global hub for technical textiles through initiatives like the National Technical Textiles Mission (NTTM) and the PLI scheme. These focus on boosting domestic manufacturing, research and development, and innovation. Mega textile parks under PM-MITRA are being developed to provide integrated infrastructure. Policies now emphasize self-reliance, sustainability, and export competitiveness, enabling India to lead in high-performance textile segments.

Technical textiles are playing a vital role in national preparedness—e.g., PPE during COVID, camouflage etc. Technical textiles, such as geotextiles and geogrids, are widely used in infrastructure and road construction for soil stabilization, drainage, and erosion control.

In India, the technical textiles market is expected to grow at a CAGR of 10.5% between Fiscal 2025 and Fiscal 2030, from US$ 28.5 billion to US$ 47.0 billion. Of this, the Indian Woven Raffia market stood at US$ 8.4 billion in Fiscal 2025, with a share of 29.5% of the total technical textile market in India.

Exhibit 4.1: Indian Technical Textile, Revenue Forecast, FY21-FY30F



Source: Frost & Sullivan Analysis

Currently, technical textiles contribute a relatively modest portion, i.e., ~11.0% of the total textile market in India. The share of technical textiles in India's total textile industry is expected to reach 18.0% by FY2030. The top four segments likely to grow at the fastest rates in the Indian market are Indutech (9.0%), Meditech (8.0%), Buildtech (8.0%), and Geotech (7.0%). Packtech (6.0%) – FIBCs and small raffia bags, which have been a mainstay of the domestic technical textile market, are expected to experience moderate growth. The extent and nature of India's National Technical Textile Mission's success are likely to impact these forecasts, depending on the market's response to the interventions made under the Mission.

India is transitioning technical textiles from a niche to a strategic sector, focusing on import replacement, national security, and value-added manufacturing. NTTM and PLI serve as complementary levers. NTTM drives innovation and capacity-building; PLI ensures scale and commercial viability. The defence and aerospace sectors are anchor users, helping to elevate domestic capabilities and attract strategic investments. Market growth forecasts position India to rapidly scale technical textile output and competitiveness, driven by policy-backed industrial momentum.

4.2. India WovenRaffia Segment Contribution to Technical Textile Market

The raffia industry plays a critical role in India's technical textile market, contributing significantly across core segments like Pack Tech, Home Tech, InduTech, ClothTech, and Mobil Tech.

The above-mentioned top 5 segments constitute 79.0% of the technical textile industry in India, i.e., USD 22.5 Bn market during FY25.

The Indian woven raffia market stood at USD 8.4 Bn during FY25 and holds a share of around 29.5% of the total technical textile market in India. Growth is driven by:

- High domestic demand from agriculture, fertilizer, cement, and logistics sectors.
- Export strength in FIBC bags and PP woven sacks to the EU, USA, Middle East, and Africa.
- Increased infrastructure spending, which has boosted the use of ground protection, geotextiles, and containment.
- With rising bans on single-use plastic, raffia-based woven bags are gaining favor for being reusable and recyclable. Eco-conscious regulations and consumer preferences are accelerating demand for eco-friendly packaging solutions.
- Online retail and packaged goods need durable, lightweight materials, making raffia bags ideal for bulk handling. Their low cost and reusability are well-suited for high-volume packaging and last-mile delivery needs.

- India has a strong polymer base and cost-efficient processing hubs, especially in Gujarat and Maharashtra.

India is home to over 1,500 raffia manufacturing units, supported by more than 2,150 tape extrusion plants and 75,000 looms, primarily concentrated in Gujarat, Maharashtra, Madhya Pradesh, Rajasthan, and parts of East and South India. The sector also forms a significant portion of India's polymer consumption, especially PP, contributing around 32% of the total PP usage.

The Indian woven raffia industry is evolving from a volume-driven sector to a value-plus, compliance-driven ecosystem that aligns with sustainable, circular economy goals. The leading players are now investing in recyclable raffia grades, biodegradable coatings, and BIS certification upgrades to meet both domestic regulatory and global buyer expectations.

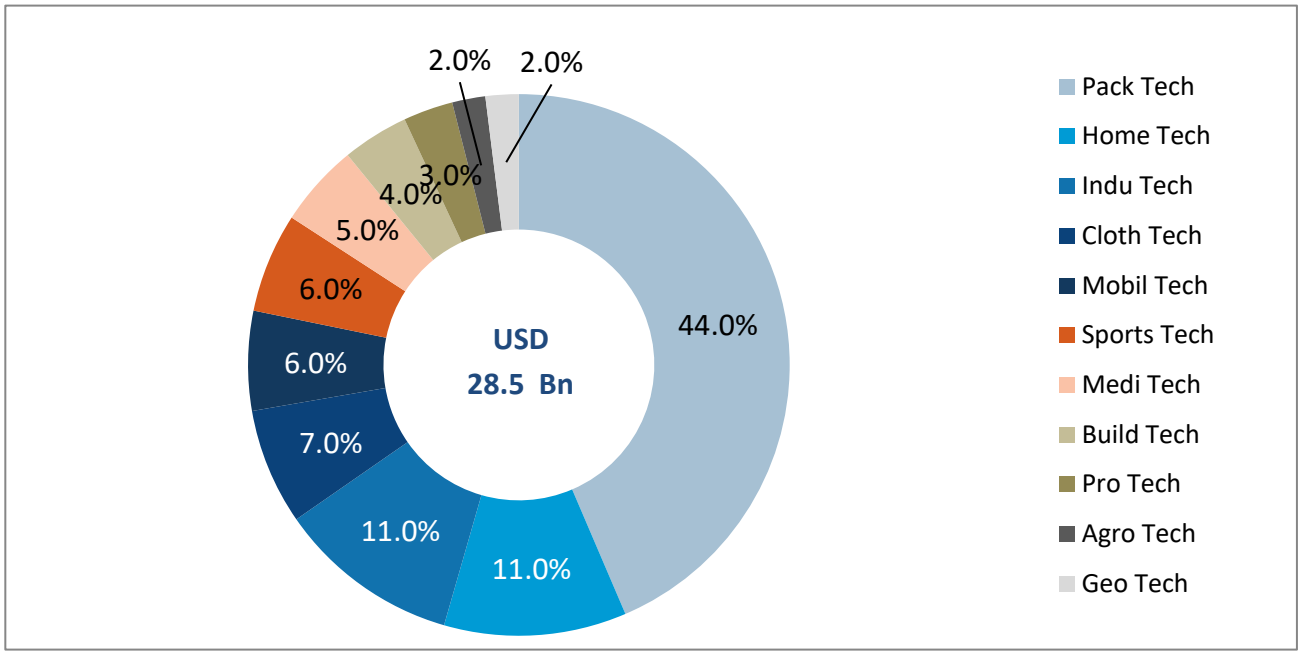
4.3. Indian Technical Textile – Market analysis by Production, Exports, Imports

Over the past decade, India's technical textile industry has experienced steady growth in both trade and domestic demand. Exports have grown from around USD 1.9 billion in FY15 to USD 2.6 billion by FY24, registering a CAGR of 6.0% –6.5%, driven by rising demand for products like FIBC bags, PPE kits, and agro-textiles. Meanwhile, imports have since moderated to around USD 2.05 billion in FY24 as domestic manufacturing improved and import substitution efforts gained traction. Domestic consumption has grown at a healthy , growth rate reflecting increasing adoption across sectors such as healthcare, mobility, agriculture, and infrastructure. India is progressing toward becoming a net exporter**,** with export value exceeding imports and significant headroom for growth in both domestic penetration and global competitiveness.

Looking ahead, the industry is poised for significant acceleration. Exports are expected to grow and , supported by the global China+1 sourcing shift, emerging Free Trade Agreements, and increasing credibility of Indian suppliers. Imports are expected to stay flat or grow modestly, as schemes like PLI and PM-MITRA enable domestic scale-up in key materials and product categories. The most substantial growth is expected in domestic consumption, which is forecasted to expand at a 10.5% CAGR during FY25-FY30, reaching USD 47 billion by FY30 and potentially surpassing USD 75 billion by FY35. This will be driven by robust demand in Med-Tech, Mobil-Tech, Indu-Tech, and Pack-Tech applications, alongside investments in infrastructure and public health. As India strengthens its position as a net exporter and scales value-added manufacturing, the country is emerging as a global hub for high-performance technical textiles.

4.4. Indian Technical Textile Market – Classification by Applications

Exhibit 4.2: Total India Technical Textile Market - Split by Application FY25 (Value in USD Bn)



Source: F&S Analysis, Technical Textile Industry, Baseline Survey

India's technical textile sector is witnessing diversified growth across key application areas. In Agrotech, India stands as a net exporter of fishing nets and raffia-based shade nets, supported by PLI schemes, BIS standards, and sustainability trends. Buildtech continues to face a production-consumption gap, relying on imports for high-performance tarpaulins and membranes, though domestic raffia-based HDPE tarpaulins remain vital, especially for infrastructure initiatives like Smart Cities and BharatMala. The Geotech segment is growing faster than the global average, driven by PP-based geotextiles used in roads, railways, and erosion control, backed by government mandates and rising exports to the Middle East and Africa. Packtech, the largest segment, is export-dominant with strong demand for raffia-based woven sacks, FIBCs, and jute products, aided by innovation in recycled PP and support from NTTM and PLI schemes. In Hometech, rising urbanization and real estate growth fuel demand for functional home textiles like carpets and upholstery, though advanced products are still import-dependent. Indutech supports core industries like cement and automotive through filtration fabrics, composites, and conveyor belts, with growing domestic capacity, yet gaps in high-end segments. Clothtech, which includes interlinings, elastics, and zippers, is closely tied to the apparel industry and is evolving with trends in performance wear and functional textiles. Mobiltech is gaining traction with growing vehicle safety norms, demand for airbags, seat belts, and insulation panels, as local production improves, though advanced materials still require

imports. Together, these segments reflect India's strategic push to become a global hub for high-performance, value-added technical textiles.

A INR 12,000 cr investment is fueling innovation, R&D, and skill development across 12 major segments (e.g., Geotech, Meditech, Protech, Agrotech). Over 17 startups are supported through the GREAT grants, and more than 2,000 students are being trained via 41 institutes under this mission.

4.5. Technical Textiles - Key Industry Production Clusters – Geographic Hubs

India's technical textile industry is anchored by several prominent regional clusters, each contributing uniquely based on local industrial ecosystems, raw material availability, and targeted application sectors.

Gujarat leads with cities like Ahmedabad, Surat, and Rajkot in agro-textiles, geotextiles, and packaging fabrics (FIBC, PP sacks), supported by a strong polymer base. Surat is also exploring laminated composites and smart industrial textiles. Maharashtra (Ichalkaranji, Bhiwandi, Kolhapur) excels in coated fabrics, automotive, and medical textiles, leveraging its proximity to the auto belt to grow in Mobil-tech, Med-tech, and Build-tech segments. Tamil Nadu (Coimbatore, Erode, Karur, Tirupur) focuses on nonwovens, industrial filters, and PPEs—post-COVID, it emerged as a Med-tech and Pro-tech hub, with Coimbatore advancing in wearable and smart textiles. Rajasthan (Bhilwara, Bikaner) specializes in woven raffia fabrics for Pack-tech and Geo-tech applications critical for infrastructure like roads, canals, and flood barriers. Uttar Pradesh (Kanpur, Noida, Ghaziabad) is gaining ground in defense textiles, nonwoven hygiene products, and composites, supported by enabling policies, medical parks, and textile zones.

Kanpur is fast emerging as a key hub for technical textiles in India, particularly in defense textiles, nonwoven hygiene products, and advanced composites. The city benefits from a strong base of skilled manpower and deep technical know-how, with a legacy of textile engineering and manufacturing excellence. Players like Lohia Corp Limited, headquartered in Kanpur, are driving innovation and capacity building in high-performance yarns and machinery. The region's growth is further supported by enabling government policies, upcoming medical textile parks, and designated textile zones, positioning Kanpur as a critical node in India's technical textile value chain.

The government's push through schemes like PM MITRA, PLI for textiles, and TechTex incubation centers is expected to further strengthen these clusters and attract investments in value-added segments.

4.6. Key Growth Drivers in the Indian Technical Textile Industry

India's technical textile industry is entering a high-growth phase, driven by strong policy support through the PLI scheme, PM-MITRA textile parks, and mandatory BIS standards. These initiatives,

enabling large-scale manufacturing, enhance product quality, and encourage investment. With the global China+1 strategy creating export opportunities and rising private sector participation, India is well-positioned to become a global hub for high-performance technical textiles.

The Government of India ("GoI") has introduced several initiatives and incentives, making the industry favourable for growth. The GoI has also focused on indigenous manufacturing through means such as production-linked incentive schemes for woven fabrics, which have two scheme slabs for providing incentives to woven fabric manufacturers, and the National Capital Goods Policy, 2016, which aims to double the local production of capital goods by 2025.

Strategic Government Interventions - PLI scheme, PM-MITRA mega textile parks, and mandatory BIS standards are enhancing manufacturing capabilities, quality compliance, and global market access, especially for high-value Pro-Tech, Med-Tech, and Mobil-Tech segments. Jointly implemented with NTTM, the PLI stimulates large-scale production by offering financial incentives for the domestic manufacturing of man-made fibers, MMF fabrics, and technical textiles, mirroring the strategy used in PPE during the COVID-19 pandemic.

Sectoral Demand Expansion - Rapid growth across key sectors, including construction, automotive, railways, agriculture, and logistics, is significantly boosting demand for functional textiles. These industries are increasingly adopting advanced materials, such as geogrids for soil reinforcement and infrastructure stability, nonwovens for insulation and hygiene applications, coated fabrics for weather-resistant and durable coverings, and filtration media for pollution control and fluid management.

Increase in Domestic Consumption - Rising demand across sectors like infrastructure, healthcare, agriculture, and automotive is driving the growth of technical textiles in India. Products such as geotextiles, PPE kits, shade nets, and automotive fabrics are experiencing increased demand as industries prioritize performance and efficiency.

Focus on Environment and Sustainability - Stricter regulations and growing awareness are pushing the industry toward eco-friendly solutions. The shift to biodegradable, recyclable, and reusable textiles supported by innovation in natural fibers is positioning India as a more sustainable and globally competitive manufacturing base.

China+1 Export Opportunity - Global buyers are actively diversifying from China, creating export opportunities for Indian manufacturers of FIBC bags, protective garments, and agro-textiles—especially to the Middle East, EU, USA and ASEAN markets.

Urbanization and Infrastructure Programs - Schemes such as Bharatmala, Jal Jeevan Mission, and Smart Cities are increasing the demand for geo-textiles, waterproof membranes, and functional nonwovens, as technical textiles become integrated into infrastructure norms.

Entry of Global Players and Innovation Ecosystem - Multinationals such as DuPont, Toray, and Freudenberg, along with Indian conglomerates, are expanding their investments in India. Growing R&D hubs, improved testing labs, and industry-academia linkages are boosting product innovation and scale.

4.7. Threats and Challenges to the Indian Technical Textile Industry

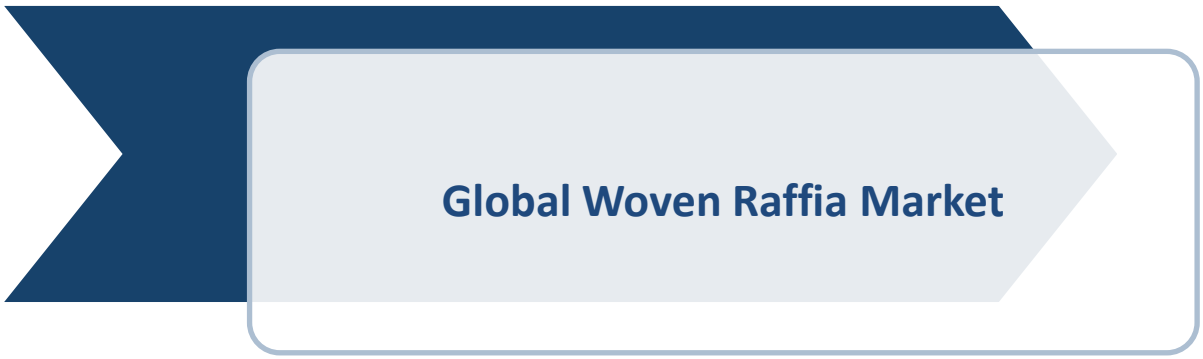
Heavy Import Dependence for Specialty Inputs - India currently imports over 65% of its high-performance fiber requirements including aramid, carbon, and glass yarns which are essential raw materials for advanced applications in the Med-Tech,Pro-Tech and Geo-Tech segments, due to limited domestic production capabilities and high technological barriers.

Fragmented SME-Dominated Value Chain - Over 80% of units engaged in the manufacturing of technical textiles are unorganized or MSMEs, often without coating/lamination lines, testing labs, or global certifications (like REACH, CE). This limits their ability to serve high-value exports or large institutional buyers in the healthcare and mobility sectors.

Limited Skilled Talent and Technical Know-How -India faces a shortage of specialized talent in functional textile engineering, material testing, and process automation. Most textile institutes still focus on spinning and weaving, not areas like smart fabrics, nonwovens, or filter media production.

Competition from Low-Cost Imports - China dominates India's imports of non-woven laminated fabrics and disposable PPEs, often undercutting local producers by 15–20%, sometimes even bypassing quality checks and BIS compliance.

Chapter 5: Global Woven Raffia Market



5.1. Global Woven Raffia Market - Overview

Raffia is a plastic resin based fabric which is further processed to produce woven sacks, FIBC and other industrial and special purpose products. Its packaging is recognized as an industrial packaging solution which is cost effective, light weight, easy to handle, durable and is recyclable. In industrial packaging, the term unequivocally refers to synthetic raffia — a durable, polypropylene-based material used in woven sacks and similar applications. The raffia industry is a key segment of the plastic processing sector, catering to both packaging and non-packaging applications. The manufacturing process includes tape extrusion, winding, weaving, coating and lamination, printing, and conversion into products such as woven sacks, bags, Flexible Intermediate Bulk Containers (FIBCs) for packaging, and geotextiles, tarpaulins, fishnets, and wrappings for non-packaging uses.

As global and domestic trade continues to grow, the demand for cost-effective, durable, and sustainable packaging solutions is increasing, where raffia packaging plays a vital role. Made from woven polypropylene (PP) or HDPE, raffia-based packaging is recognized for being lightweight, strong, easy to handle, and recyclable. Among the available packaging materials, such as jute, paper, and flexible films, raffia stands out for its strength, breathability (enabled by micro-perforations), and suitability across a variety of industrial applications. While jute and paper are biodegradable, they are also costly, less durable, and have limited availability.

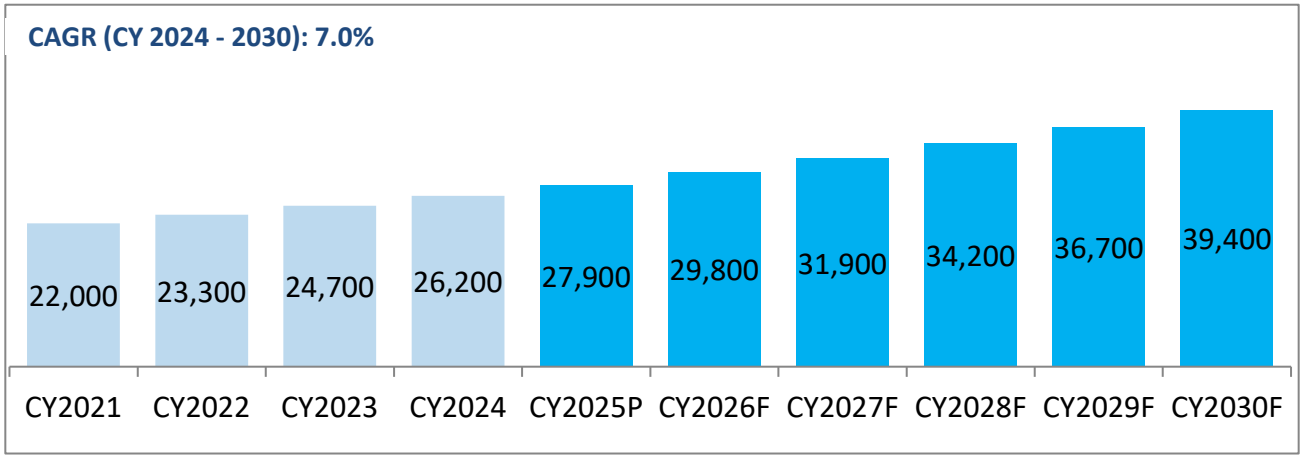
Flexible packaging is suitable for retail and food use, but not ideal for bulk or breathable needs. Within raffia, PP is preferred for bags and sacks due to its better tensile strength, drop-test performance, and productivity, while HDPE is more suited for sun-exposed coverings, such as tarpaulins. Overall, raffia provides an optimal balance of performance, cost, and sustainability, making it a crucial component in industrial and logistics packaging.

Woven fabric machines are used in a wide range of packaging applications across various industries, including the packaging of cement, fertilizer, chemicals, polymer, food grain and minerals, as well as in the production of shopping bags, leno bags, FIBC and container liners. They are also utilized in a variety of non-packaging applications, such as wrapping fabric, roof underlayment, lumber wrap, pond liner, tarpaulin, geotextile, geogrid, ground cover, carpet backing, ropes and twines.

5.1.1. Global Woven Raffia – Market Size by value and Volume

The Global woven raffia market is estimated to be around 26,200 KT during 2024 and projected to reach 39,400 KT at a CAGR of 7.0% by 2030. This growth is driven by increasing demand for durable and reusable packaging in agriculture, infrastructure development and industrial logistics

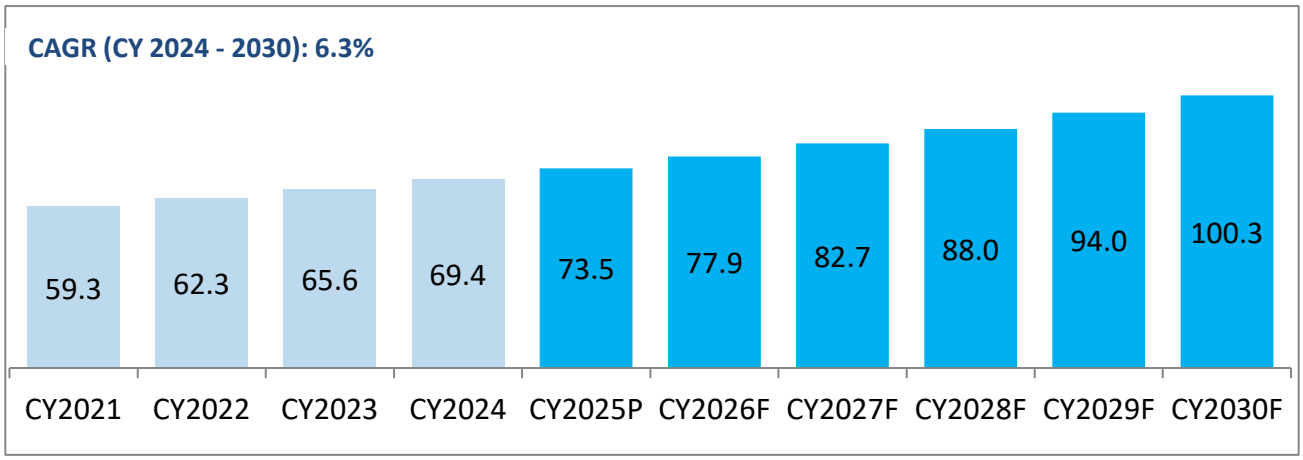
Exhibit 5.1: Total Global Woven Raffia Market volume from CY 2021-2030 (KT)



Source: Frost & Sullivan Analysis and ICIS

Global woven raffia market was USD 69.4 Bn in 2024 and projected to reach USD 100.3 Bn by 2030 at a CAGR of 6.3%. The fall in realization in recent times is due to intense price competition, oversupply from low-cost Asian producers, and a shift toward lower-margin, commodity-grade products. The global woven sack and fabric market is growing primarily due to rising demand for sustainable and cost-effective bulk packaging across sectors like agriculture, cement, and chemicals. As industries shift away from single-use plastics, woven polypropylene bags offer a durable, reusable, and recyclable alternative that aligns with global sustainability goals. Additionally, infrastructure growth and expanding agri-exports—especially in emerging marketsare fueling higher consumption of woven packaging materials, further accelerating global demand.

Exhibit 5.2: Total Global Woven Raffia Market value from CY2021- 2030 (USD Bn)

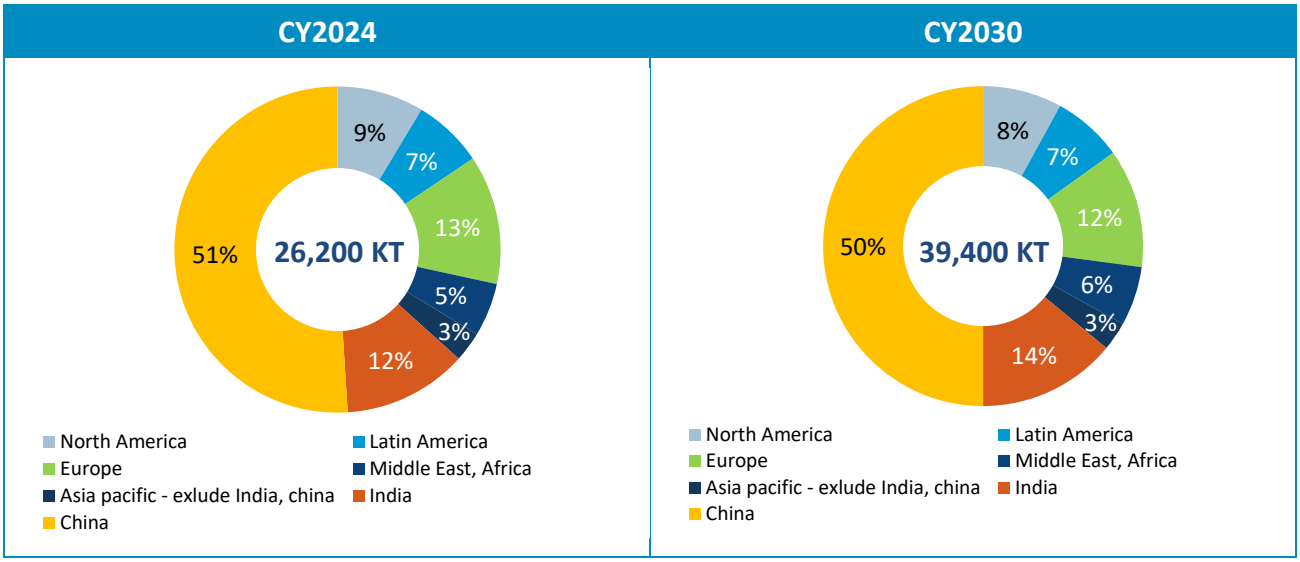


Source: Frost & Sullivan Analysis

5.1.2. Global Woven Raffia – Market Split by Region

China is the largest consumer of woven raffia, driven by its 50% share in global cement production, major agricultural production, and massive infrastructure needs. North America and Europe are major importers, using woven sacks for agriculture, industrial, and sustainable packaging applications. North America benefits from being a hub for corn and polymer manufacturing, while Europe emphasizes eco-friendly solutions. India serves as a global sourcing hub, with strong domestic demand from the agriculture, cement, fertilizer, food grains, and infrastructure sectors, which rely on durable, cost-effective woven packaging.

Exhibit 5.3: Woven Raffia Market Forecast, Split by Region, By Volume, Global, CY2024-2030

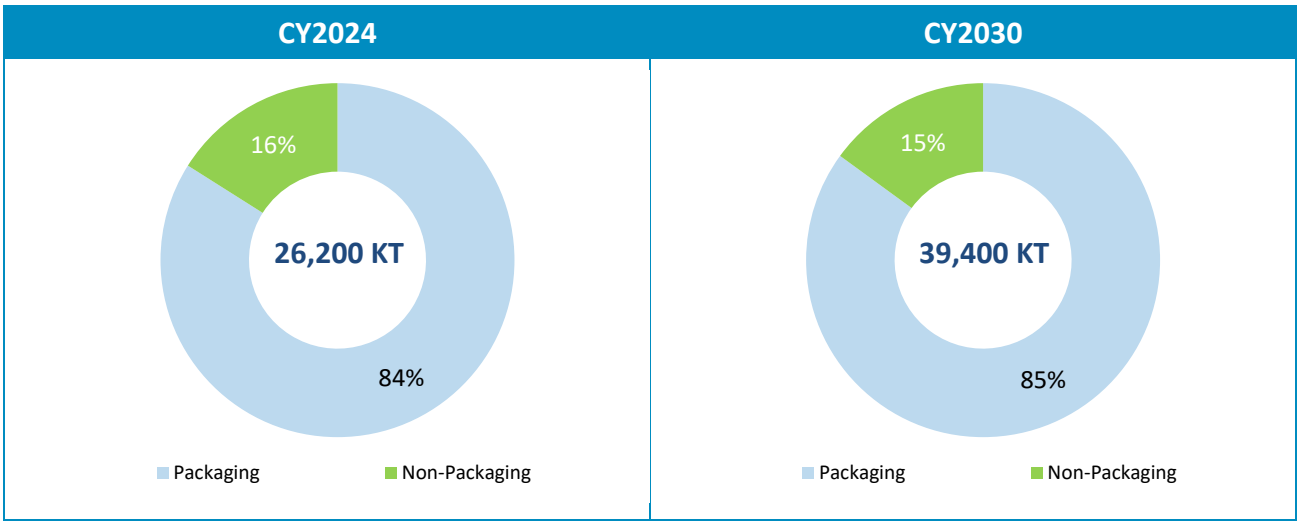


Source: Frost & Sullivan Analysis

5.1.3. Global Woven Raffia – Market Split by Application

In the global woven raffia market, Packaging is having the maximum market share while non-packaging is expected to get traction in the forecast period. Packaging consists of woven sacks and FIBCs, while non-packaging includes wrappings, tarpaulins, geotextile, and special-purpose applications.

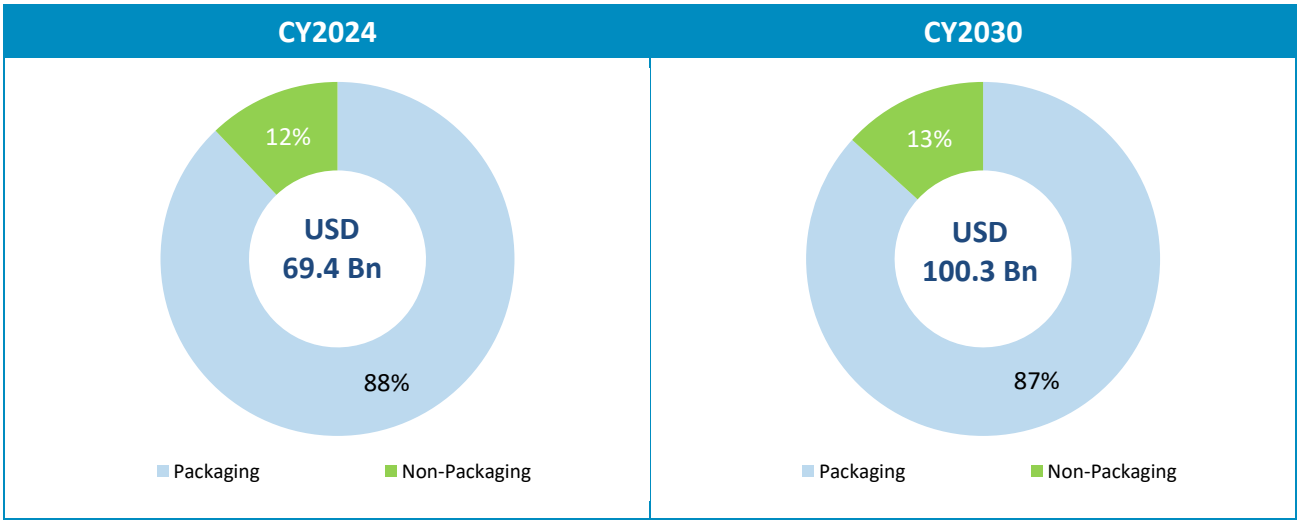
Exhibit 5.4: Raffia Market split by Application, By Volume, Global, CY2024- 2030



Source: Frost & Sullivan Analysis

The packaging market holds a larger share in terms of value because of high-value products such as FIBCs. At the same time, non-packaging includes geotextile, tarpaulins, wrappings, pond liners, roof covering etc.

Exhibit 5.5: Raffia Market split by Application, By Value, Global, CY2024- 2030



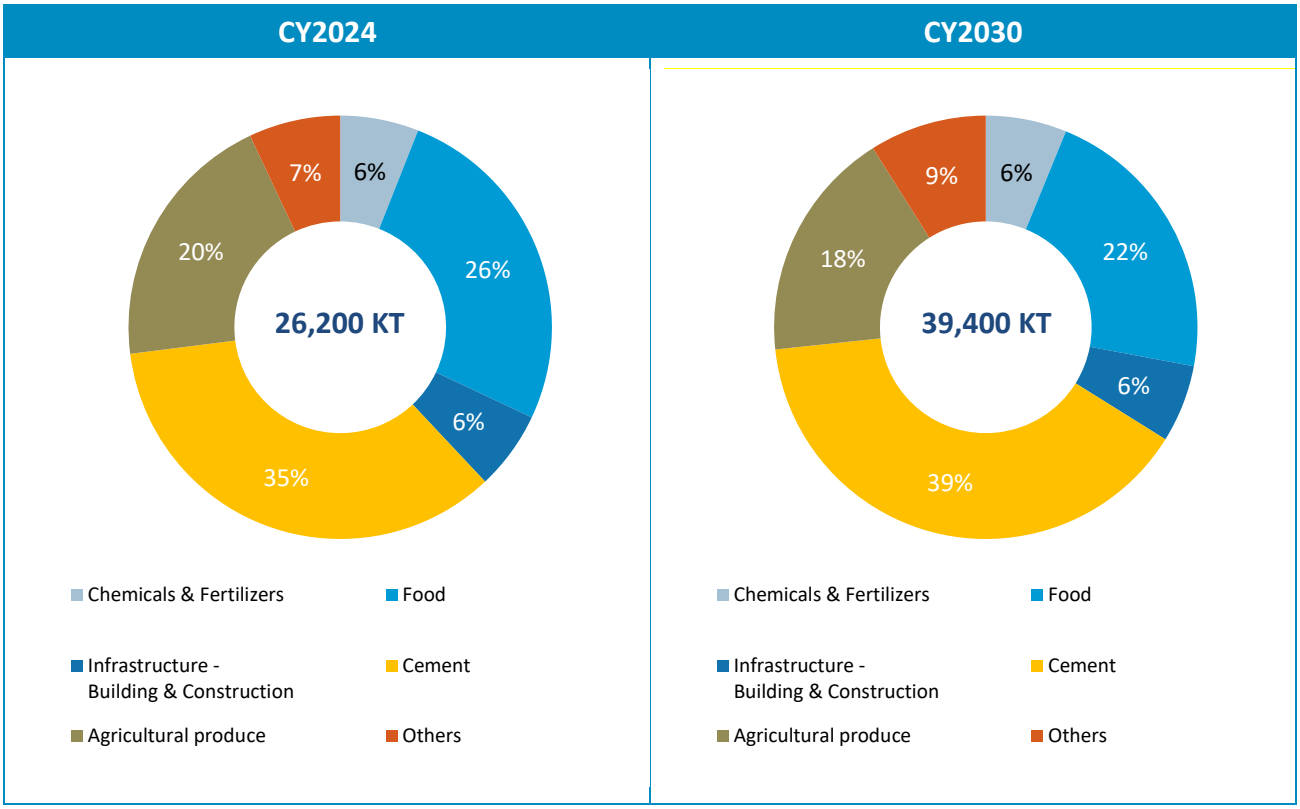
Source: Frost & Sullivan Analysis

5.1.4. Global Woven Raffia – Market Split by Industrial Usage

In terms of application, cement continues to be the largest consumer of raffia-based woven sacks in 2024, both by volume and value. Global cement production stands at approximately 4.6 billion tons,

with China maintaining its dominance at around 53% share, driven by sustained infrastructure and real estate activity.

Exhibit 5.6: Woven Raffia Market split by Industrial usage, By Volume, Global, CY2024- 2030

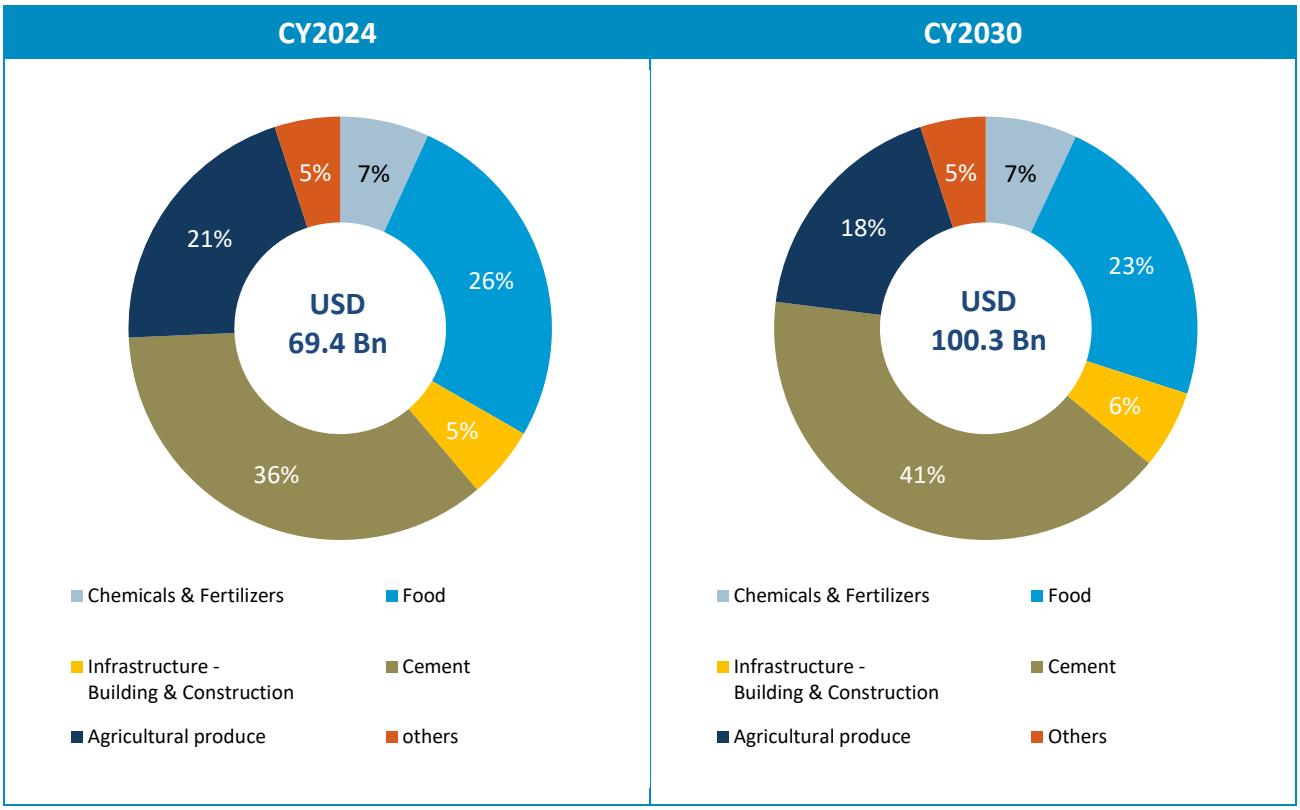


Source: Frost & Sullivan Analysis

India remains the second-largest producer, contributing around 8.5% of global output, supported by a government-led infrastructure push and housing projects. The cement industry accounts for an estimated 34–36% share of the global raffia packaging market in 2024, reaffirming its position as the single largest application segment.

The second largest application segment is foodgrain and agricultural produce, which collectively contribute to 46% of raffia demand. Global food grain production stands at approximately 2.8 billion tons, comprising wheat, rice, and coarse cereals. In addition, there is significant production of vegetables, pulses, and oilseeds, which also rely heavily on raffia packaging solutions.

Exhibit 5.7: Woven Raffia Market split by Industrial usage, By Value, Global, CY2024- 2030



Source: Frost & Sullivan Analysis

The other market is distributed among other bulk-use sectors such as salt, sand, and industrial minerals. Overall, the raffia woven sack industry is witnessing steady growth, supported by expanding infrastructure and agricultural packaging needs, .

5.2. Global Trade Scenario for Woven Raffia Sacks

Top FIBC & FIBC Fabric Net Exporter Countries:

India continues to maintain its position as the top global exporter of FIBCs, commanding over 50% of global shipments by volume. This dominance is largely attributed to its cost-efficient manufacturing base, robust production infrastructure, and reliable supply chain capabilities. India's dominance continues, remaining the world's largest exporter of FIBCs and jumbo bags benefiting from scale, cost efficiency, and export infrastructure.

Southeast Asian countries like Vietnam and Indonesia are steadily gaining ground, These countries are leveraging regional manufacturing strengths, lower labor costs, and strategic proximity to key growth markets to expand their presence in the global FIBC trade.

China, once a major exporter of finished FIBCs, has seen a decline in its global share over the past five years. While it remains a key supplier of FIBC fabric and semi-finished materials, factors such as rising production costs, trade tensions, and shifting buyer preferences toward duty-free sourcing have reduced its competitiveness. China is now repositioning itself as a provider of value-added, technical-grade packaging and focusing more on domestic market demand.

Top FIBC & FIBC Fabric Net Importer Countries

The U.S. remains the top importer of FIBC and FIBC fabric, driven by strong demand across industrial sectors. European countries like Germany, the UK, and France also show consistent import volumes, reflecting reliance on external suppliers for quality FIBC products. Japan and South Korea import smaller but higher-value volumes for specialized applications. Brazil and Canada are emerging growth markets with rising import demand. With China shifting focus away from finished exports, countries like India and Vietnam are well-positioned to capture market share. Overall, global imports show a mix of finished and semi-finished FIBC, indicating downstream customization by end-users.

5.3. Key Trends and Technological Innovations for Woven Raffia

5.3.1. Key Emerging Trends

a. Automation Trend

Industry is implementing machinery with automated granule filling, baling, sizing, quality control features, and use of conversion machines to reduce dependence on unskilled and semi-skilled manpower, to reduce operational cost, and to improve efficiency and quality of raffia products

b. Eco-Friendly Trend

Industry is more concerned about its sustainability goal to reduce carbon footprint and utilize more eco-friendly materials in their processes, thus creating more products that achieve a more environmentally friendly goal. There is also availability of biodegradable material that can dissolve after 3 months in soil, turning into C02 and H20, and thus transform into an environmentally friendly sector.

c. Recycling in a single step

Efficient recycling of PP/HDPE raffia is now possible to process in a single step, even with the constraints of size and strength of the material waste (e.g., FIBC and jumbo bags). Now, a one-step process with shredder, extruder, pelletizer all integrated into one simple, easy-to-operate recycling machine enables higher throughput for woven sack manufacturing.

Recycling market continues to develop – woven sacks bring great convenience to the storage and logistics process, and are widely used, so there are more waste woven sacks. Polypropylene, the raw material of woven bags, has a recycling value and can be reused, which not only has environmental protection significance but also yields certain economic benefits. With increasingly

strict environmental protection standards and government support, the demand for recyclable woven bags is on the rise. An increasing focus on EPR policy will enhance recycling activities worldwide, thereby driving demand for machinery to recycle these materials.

5.3.2. Advancements and Technology trends

Woven sack manufacturing involves the interaction of various machines and process parameters to produce the desired output.

Woven sack or bag making is a complex process. A misstep or improper procedure at any stage can compromise the structural integrity of the output.

Advancements in woven raffia (PP woven fabric) manufacturing are being driven by automation, material efficiency, and smart technologies. Modern raffia tape extrusion lines now feature energy-efficient heaters, automatic thickness control, and melt filtration systems, enabling higher output with minimal waste. Circular weaving machines have become more sophisticated, offering electronic tension control and auto warp/weep detection for better fabric consistency and strength. In bag conversion, automation is transforming operations with integrated systems for cutting, valve formation, stitching, and stacking, reducing labor dependence and improving productivity. Technological improvements in material handling now allow up to 35–40% recycled polypropylene to be used without compromising fabric quality. For laminated sacks, ultrasonic and hot air sealing are replacing traditional stitching, offering leak-proof, durable joints ideal for fertilizer, food grains, and cement packaging. Additionally, digital printing and upgraded lamination units enable customized, high-finish sacks for retail and export markets. The adoption of IoT-based monitoring and AI-driven quality inspection tools is further pushing the industry toward smart, compliant, and efficient production systems.

5.3.3. Global Woven Raffia – Regulatory Trends

In 2024, global regulations continue to favor recyclable and reusable packaging, creating strong tailwinds for woven raffia products, particularly in the EU:

1. **Stricter EU Packaging Laws:**
   The newly adopted Packaging and Packaging Waste Regulation (PPWR) mandates that all packaging in the EU must be recyclable by 2030, introduces reuse/refill targets, and bans harmful substances like PFAS. This aligns well with woven PP raffia sacks, which are durable and recyclable.
2. **SUP Directive & EPR Expansion:**
   The Single-Use Plastics Directive remains active, with extended producer responsibility (EPR) systems requiring companies to manage the cost of waste and clean-up. Packaging that scores higher in recyclability and reuse—like woven raffia—will attract lower EPR fees.
3. **4evergreen Alliance Progress**
   The 4evergreen initiative continues to drive circularity by promoting recyclability protocols,

collection systems, and design standards. While focused on fiber-based packaging, its principles offer a strong framework for raffia producers aiming to meet EU compliance and circular goals.

5.3.4. Woven Sacks Recycling Trends

Recycling of Cement Woven Bags & Global Practices

The cement industry generates the highest volume of used woven sacks and FIBCs, which are typically made from virgin material, masterbatch, and UV coating. These bags are cleaned (often by water), shredded, and recycled into PP granules. Due to the addition of masterbatch and coatings, these polymers are usually colored and used to manufacture low-cost plastic products, such as buckets and slippers.

Developed Regions

Stringent regulations on tensile strength of cement sacks limit the use of recycled material to less than 3-4 percent in the US and European countries. Almost all the cement sacks from this region are sent to the Asian market for recycling. The recycled polymers are sent to nearby areas where blow-molding and injection molding industries are predominant for conversion.

Developing Regions

High cement demand and remote construction sites favor the use of sacks over silos. In China, up to 35% recycled polymer and 10% calcium carbonate is allowed, though some use 100% recycled content. Semi-automated handling systems minimize sack damage and labor.

India's Scenario

India's recycling hubs include Dhoraji (Gujarat), Aurangabad (Maharashtra), and Hyderabad (Telangana). Approximately 30% of used sacks are reused by farmers and small industries. The BIS (Bureau of Indian Standards) allows up 8% calcium carbonate while making cement sacks. There has been recent debate about including recycled polymers and reducing the calcium carbonate content. There is scope for adding 35 percent or more recycled polymer while making cement sacks.

5.4. Key Growth Drivers of Global Woven Raffia Market

Woven Sacks are mainly used for packaging cement, Food Grains, chemicals, and Fertilizers. Double-sided printing is preferred in PP woven sacks. Technical specifications in PP woven sacks include UV (ultraviolet) protection, as well as water- and dust-proof designs. Manufacturers are developing flexible and high-strength PP woven sacks. These sacks are suitable for packaging sugar, animal feed, barley, and salt, among other products.

5.4.1. Global - Key Areas where Woven Sacks are growing

a. Use of Heavy-duty PP Woven Sacks for Packing

Woven sacks are being publicized as customizable, economical, and durable sacks that are being used for the transportation of products and for storage in large quantities. Apart from FIBC, agriculture and food applications, stakeholders are tapping revenue opportunities in storage applications for detergents, spices, and construction materials.

Manufacturers in the woven sacks market are increasing their production capabilities for heavy-duty PP woven sacks that are being used for packing raw materials such as whole grains, cement, and stone chips, and sugar, among other products. These sacks are being printed and customized as per the client demands. Low cost and extremely durable attributes of PP woven sacks are grabbing the attention of end users. This helps to store products and raw materials for longer periods.

b. Reusable, Highly Economical Woven Sacks

The storage of seeds and chemicals is catalyzing the demand for woven sacks. Such trends are contributing to the growth of the woven sacks market. Manufacturers in the woven sacks market are increasing the availability of reusable, highly economical, and highly durable woven sacks. The demand for reusable woven sacks is rising due to global bans on single-use plastics and stricter EPR regulations. These sacks offer superior durability, making them ideal for repeated use in retail, agriculture, and industrial sectors. Consumers prefer them for their eco-friendly appeal, while businesses value the branding opportunities through custom printing. Over time, their reusability also leads to cost savings compared to disposable alternatives.

Woven fabric for tarpaulin, geotextile, and ground covering applications

With increasing disruptions in global weather, the uncertainty of food grain spoilage has increased; therefore, demand for tarpaulin has risen to protect agricultural produce from extreme heat and rain during storage and transportation. Tarpaulin is also used in disaster management. Geotextile fabric is utilized in civil engineering and construction to enhance soil stability, improve drainage, and control erosion.

c. Shopping Bags, carry bags

With the widespread ban on single-use plastics across many countries, conventional polyethylene carry bags are being phased out. As a result, consumers are increasingly encouraged to bring reusable bags from home, while retailers and supermarkets are adopting more sustainable alternatives. Woven polypropylene bags have emerged as a durable and eco-friendly solution, already being offered by several major retail chains in Europe, including early adopters in Germany.

5.4.2. Advantages of Woven Sacks over Jute, Paper, and Woven Cloth Bags

PP woven sacks offer the best cost-performance balance—ideal for industrial bulk packaging due to low cost, high moisture resistance, and durability. Woven cloth bags score highest on reusability and

sustainability, making them suitable for retail and eco-conscious applications despite moderate cost. Jute and paper are less durable and moisture-resistant, limiting their use to dry or short-distance packaging needs. Jute poses the highest risk of infestation and microbial attack, requiring extra care or lining for sensitive products.

5.5. Global Plastic Usage Trends

5.5.1. Replacement of Single-Use Plastics (SUP) - Global Trends and Initiatives

India

India introduced a three-phase ban on SUPs, including cutlery, wrapping films, and non-woven plastic bags under 240 microns. This regulatory move has opened large-scale opportunities for woven PP and cloth bags as durable, compliant alternatives. With increasing emphasis on Extended Producer Responsibility (EPR) and recycled content, the demand for reusable, regulation-compliant woven bags is set to grow in both retail and agri-industrial applications.

In the packaging industry, for instance, there is an increasing requirement for woven plastic bags for packaging food grains owing to the unavailability of jute bags, as the jute mills have failed to meet demands, and the cost of raw jute has increased significantly. Similar government regulations have increased the demand in end-use products that are manufactured by our machines. India has prohibited the manufacture, import, stocking, distribution, and sale of certain single-use plastics, including non-woven bags below 240 microns in thickness. In Europe, with similar prohibitions on single-use plastics, woven bags have found their way as an alternative to thin plastic bags below 50 microns.

European Union

Under its Single-Use Plastics Directive and broader Circular Economy Action Plan, member states are introducing plastic packaging taxes—typically ranging between €200 €300 per tonne—for packaging that lacks minimum recycled content (often 30%). Additionally, the EU-wide Extended Producer Responsibility (EPR) mandates place full financial responsibility for packaging waste collection, recycling, and reporting on producers. These combined regulations are driving companies across the EU to shift toward more sustainable options, such as woven polypropylene (PP) bags, which offer improved recyclability, durability, and reduced regulatory risk.

United Kingdom

The UK's Plastic Packaging Tax (since April 2022) imposes a levy of ~£200/tonne (increasing annually) on plastic packaging with less than 30% recycled content. Alongside this, an Extended Producer

Responsibility (EPR) scheme will soon transfer the full cost of packaging waste to producers, expected to raise approximately £2 billion per year. These policies are incentivizing businesses to switch to recycled or reusable formats, such as woven PP bags, to avoid cost penalties and improve compliance.

Russia

A nationwide SUP ban eliminates key disposables, creating space for reusable woven bags, especially in retail and hospitality packaging.

Brazil

Regulatory approval of PP raffia sacks for treated seeds is accelerating the adoption of woven packaging in agriculture, replacing paper sacks for improved durability.

5.5.2. Innovations in Woven Fabric Conversion

Innovations in woven fabric conversion are rapidly advancing through automation, sustainability, and smart technologies. High-speed, servo-driven machines now perform cutting, stitching, and sealing with enhanced precision, significantly improving productivity and consistency. New extruders are designed to handle higher percentages of recycled PP and HDPE, helping manufacturers meet sustainability and EPR targets without sacrificing quality. Ultrasonic welding is emerging as a cleaner alternative to stitching, providing leak-proof joins ideal for food grains and fertilizer packaging. Digital printing technologies, including UV-curable and inkjet systems, enable high-resolution graphics directly on laminated woven surfaces, supporting brand customization even at low volumes. Eco-friendly developments, such as biodegradable coatings and breathable laminates, are replacing traditional PE films, thereby improving recyclability and moisture control for agro-based applications. Meanwhile, edge reinforcement and fully automated valve bag machines are boosting strength and efficiency in bulk packaging for industries like cement and chemicals. Finally, smart quality control systems featuring IoT-enabled sensors and vision-based defect detection, enabling real-time monitoring and QR or RFID-based traceability, push the woven fabric industry toward a more intelligent and compliant future.

5.5.3. Extended Producer's Responsibility (EPR) - Global Regulatory Trends

India

Under the amended Plastic Waste Management Rules, India's Extended Producer Responsibility (EPR) framework mandates producers, importers, and brand owners to meet progressive plastic recycling targets. This regulatory push is accelerating a shift away from single-use plastics, encouraging manufacturers to adopt eco-friendly packaging alternatives such as paper-based

materials, jute bags, and woven polypropylene sacks, supporting both compliance and sustainability goals.

United States

The U.S. lacks a federal EPR law, but several states (e.g., Maine, Oregon, Washington, New York, California) are actively implementing state-level EPR programs with producer fees and recycling targets. These laws aim to rebuild recycling infrastructure and support a circular economy, especially after China's import ban on recyclables. Reusable and recyclable packaging is gaining traction in progressive states.

Germany

Germany has introduced an Extended Producer Responsibility (EPR) system for single-use plastics, in line with the EU's Single-Use Plastics (SUP) Directive. Producers must register, report usage data, and contribute to the cost of waste management. This regulation will discourage single-use formats and boost the demand for reusable packaging solutions like raffia and woven bags.

United Kingdom

In 2024, the UK introduced Extended Producer Responsibility (EPR) for household packaging, shifting the entire cost burden onto producers. Combined with the Plastic Packaging Tax on non-recycled materials, businesses are being steered toward recyclable and reusable packaging. This is encouraging a shift to sustainable alternatives like PP woven sacks and cloth bags.

Brazil

Brazil enforces a reverse logistics system under a sector agreement, requiring producers to invest in recycling cooperatives and voluntary collection points. A 2023 decree formalized this with certification requirements, but there is still no mandatory reporting or EPR fees. The focus remains on take-back systems and consumer awareness, preparing the ground for a formal EPR structure.

Chile

Chile's new packaging EPR law requires mandatory recycling rates and the submission of waste management plans. Producers have set up collective systems to manage packaging waste. These laws promote reuse-focused systems, opening opportunities for recyclable and reusable packaging formats.

5.6. Threats and Challenges to the Global Woven Raffia Market

- **Volatile Raw-Material Costs -** Synthetic raffia relies on polypropylene, a petrochemical derivative, making it highly sensitive to crude oil price fluctuations.

- **Environmental & Regulatory Pressure -** Synthetic Raffia doesn't come under Single Use Plastic (SUP) in any country. However, the shift towards biodegradable or recycled materials requires significant R&D investment and raises cost pressures.
- **Competition of Alternate Materials -** Materials like jute, cotton, cardboard, and bioplastics may emerge as eco-friendlier substitutes, especially in packaging and agriculture, which may erode raffia's share in traditional segments. There is currently no known substitute or alternative for Raffia products. Non-woven, Jute, and paper are not substitutes due to their availability, cost, and performance.
- **Supply Chain Disruptions & Regional Instability -** Synthetic raffia supply chains are exposed to geopolitical risks and raw material trade fluctuations.

Domestic Woven Raffia Market

6.1. Industry Overview of the Indian Woven Raffia Market

The Raffia industry in India, known for producing flat tape woven fabric and sacks, has been established for over 50 years. It emerged as a reliable alternative to jute sacks, which faced supply shortages and limitations in meeting bulk packaging needs. With the rise of polypropylene (PP) woven sacks, the industry rapidly expanded and now plays a critical role in India's packaging sector.

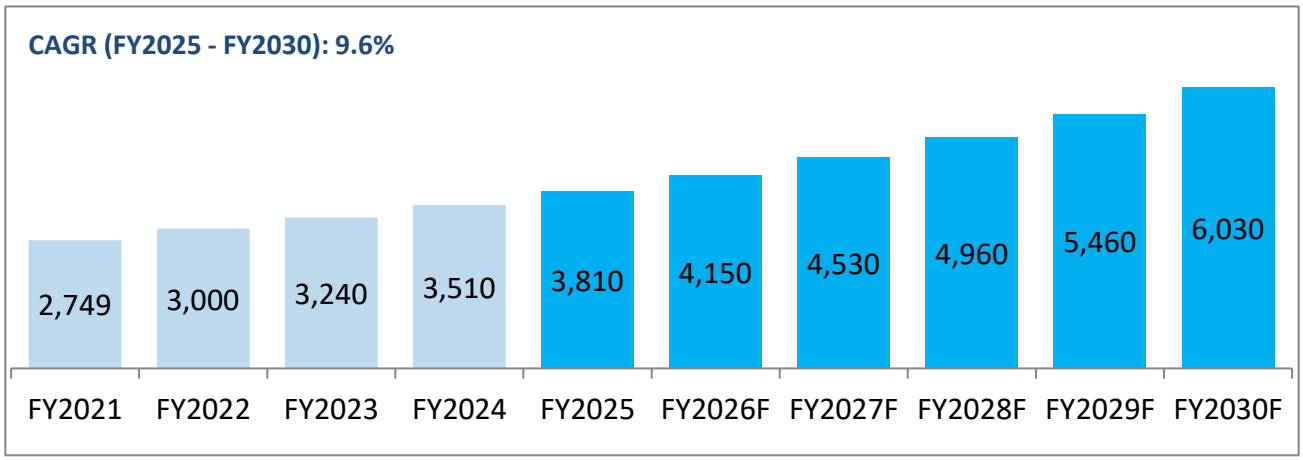
Today, the Indian woven Raffia industry comprises over 1,500 small and medium-scale units spread across the country. It supports essential sectors, including cement, fertilizers, agriculture, chemicals, and construction materials, making it a significant contributor to economic growth. The industry's expansion is closely tied to the development of these sectors.

Despite jute's traditional role in packaging primarily in the eastern region, its limited availability and stagnant growth have reinforced the relevance of Raffia-based solutions. In line with global trends, the Indian woven Raffia industry has seen remarkable growth in the past two decades. The increasing emphasis on sustainability and environmental protection is also driving the shift toward reusable and recyclable high-performance woven sacks, thereby securing the industry's continued relevance in the future.

6.1.1. Indian Woven Raffia – Market Size by Value and Volume

Indian woven raffia market is estimated to be around 3,810 KT during FY2025 and projected to reach 6,030 KT at a CAGR of 9.6% by FY2030.

Exhibit 6.1: Total Indian Woven Raffia Market volume from FY2021-2030 (KT)



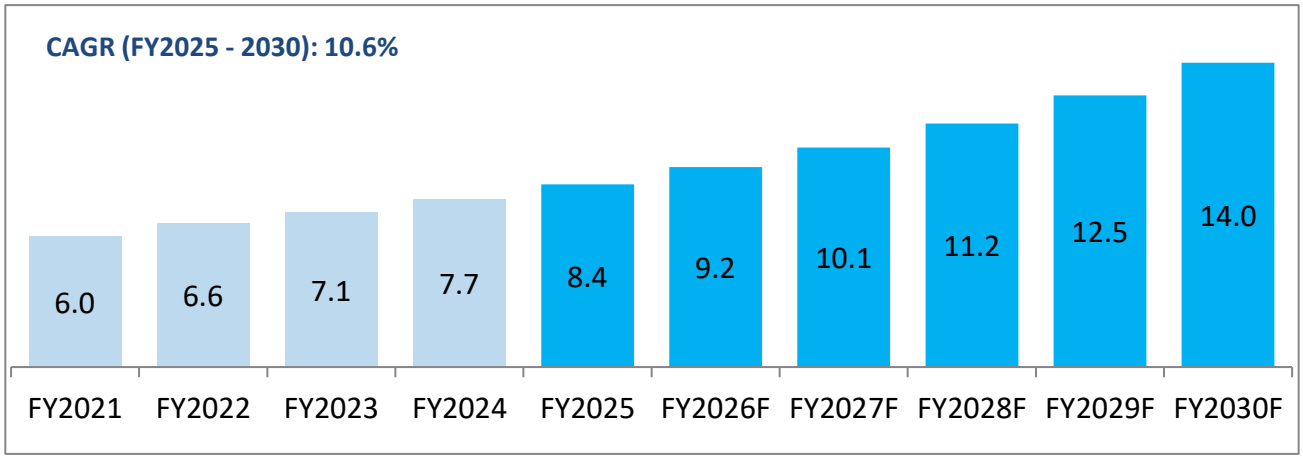
Source: Frost & Sullivan Analysis and ICIS

Note: All raffia types are included.

The Indian woven raffia market was USD 8.4 Bn in FY2025 and projected to reach USD 14.0 Bn by FY2030 at a CAGR of 10.6%. Multiple factors drive the strong growth in the Indian woven sack market. Increased infrastructure development and housing demand are boosting cement and

construction material packaging needs. Simultaneously, rising agricultural production and fertilizer consumption are expanding usage in rural supply chains. Export growth in commodities like rice, sugar, and chemicals is fueling demand for high-quality, export-grade sacks. Additionally, sustainability regulations and EPR mandates are pushing industries to adopt recyclable and reusable woven packaging solutions, further accelerating market expansion. PP-based raffia accounts for ~90%, Other polymers (like HDPE, blends) make up ~10%. As of March 31, 2025, India is the second largest consumer of PP Raffia globally.

Exhibit 6.2: Total India Woven Raffia Market value from FY2021- 2030 (USD Bn)



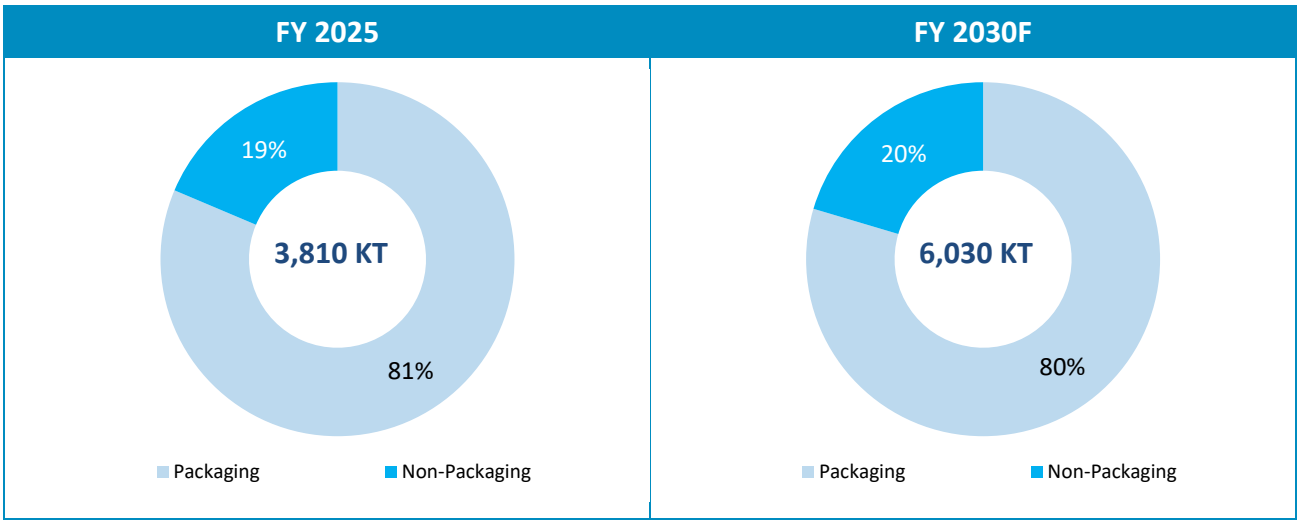
Source: Frost & Sullivan Analysis

It is expected that there will be a strong growth in exports of Raffia products from India. India has a large and expanding woven Raffia market, which is driven by the increasing substitution of jute bags.

6.1.2. India Woven Raffia – Market Split by Application

Packaging has the maximum market share in India. Packaging consists of woven sacks and FIBCs, while non-packaging includes wrappings, tarpaulins, geotextile, and special-purpose applications. The non-packaging segment is expected to grow faster in the forecast period. From FY2025 to FY2030, the packaging sector market is projected to grow from 3,100 KT to 4,800 KT, registering a CAGR of 9.1%. Over the same period, the non-packaging sector is expected to expand from 710 KT to 1,230 KT, growing at a faster CAGR of 11.6%.

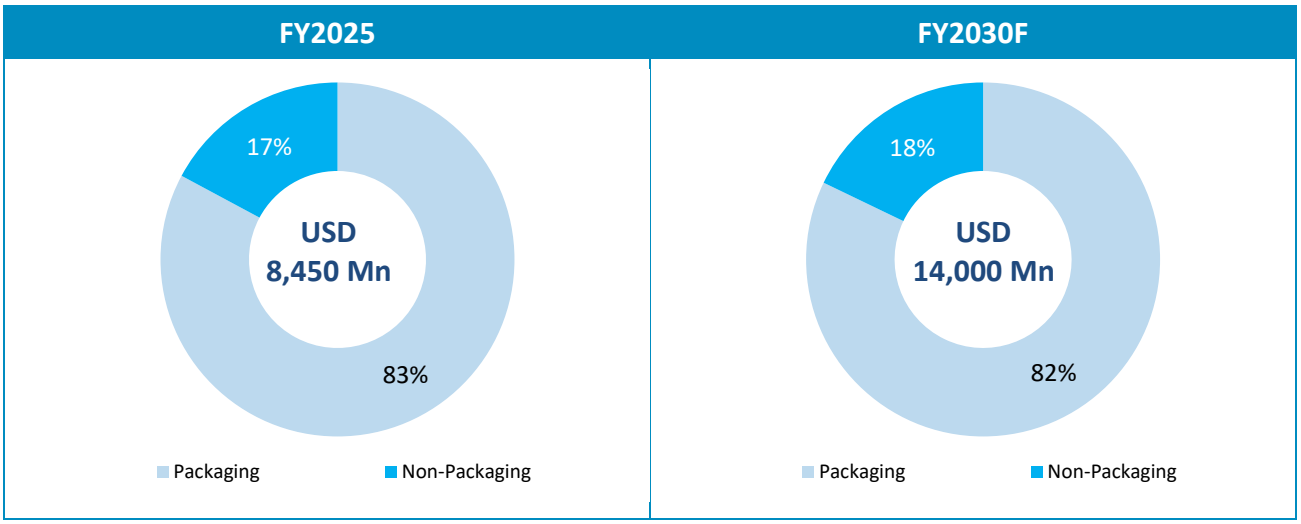
Exhibit 6.3: Raffia Market split by Application, By Volume, India, FY 2025- 2030F



Source: Frost & Sullivan Analysis

Non-Packaging: In India, the Geosynthetics segment, which includes geotextiles, geomembranes, and other geo-engineering products, is a relatively new entrant in the Raffia industry. Although this segment is in the nascent stage, in recent years has shown rapid growth and popularity, particularly in the pond lining sector.

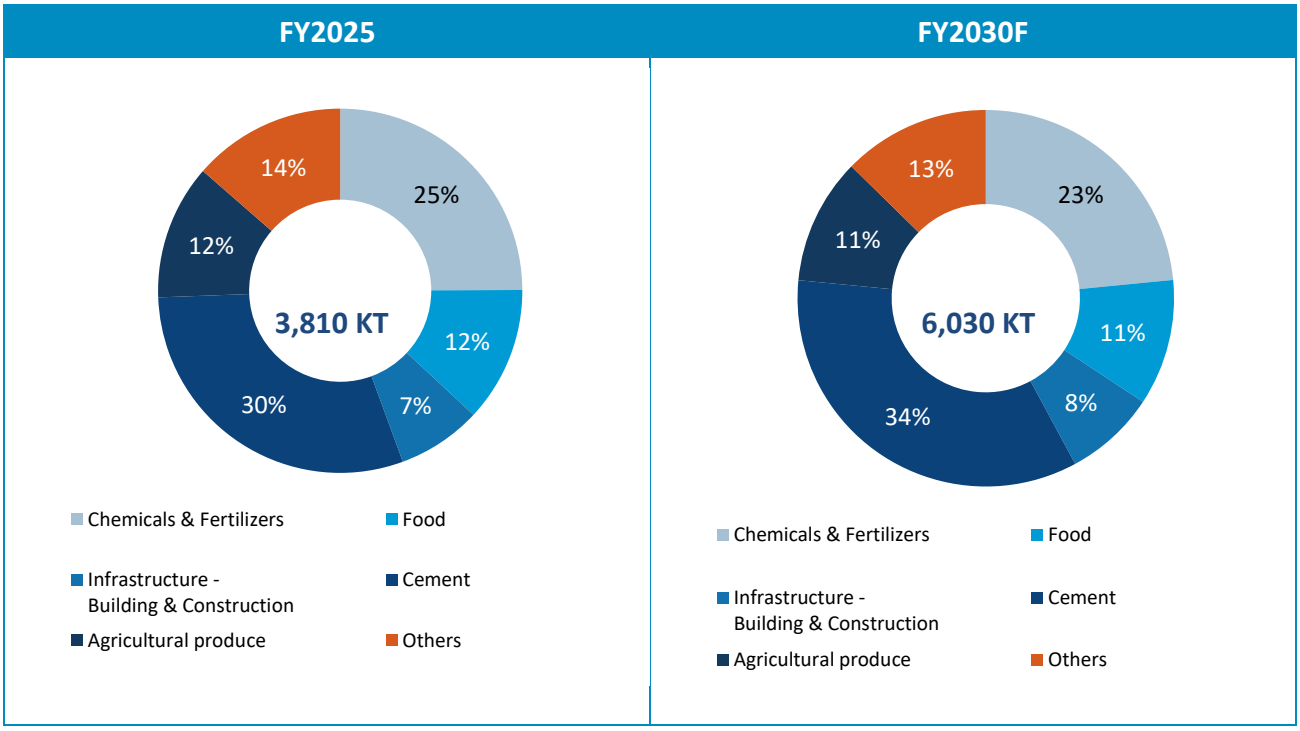
Exhibit 6.4: Raffia Market split by Application, By Value, India, FY 2025- 2030F



Source: Frost & Sullivan Analysis

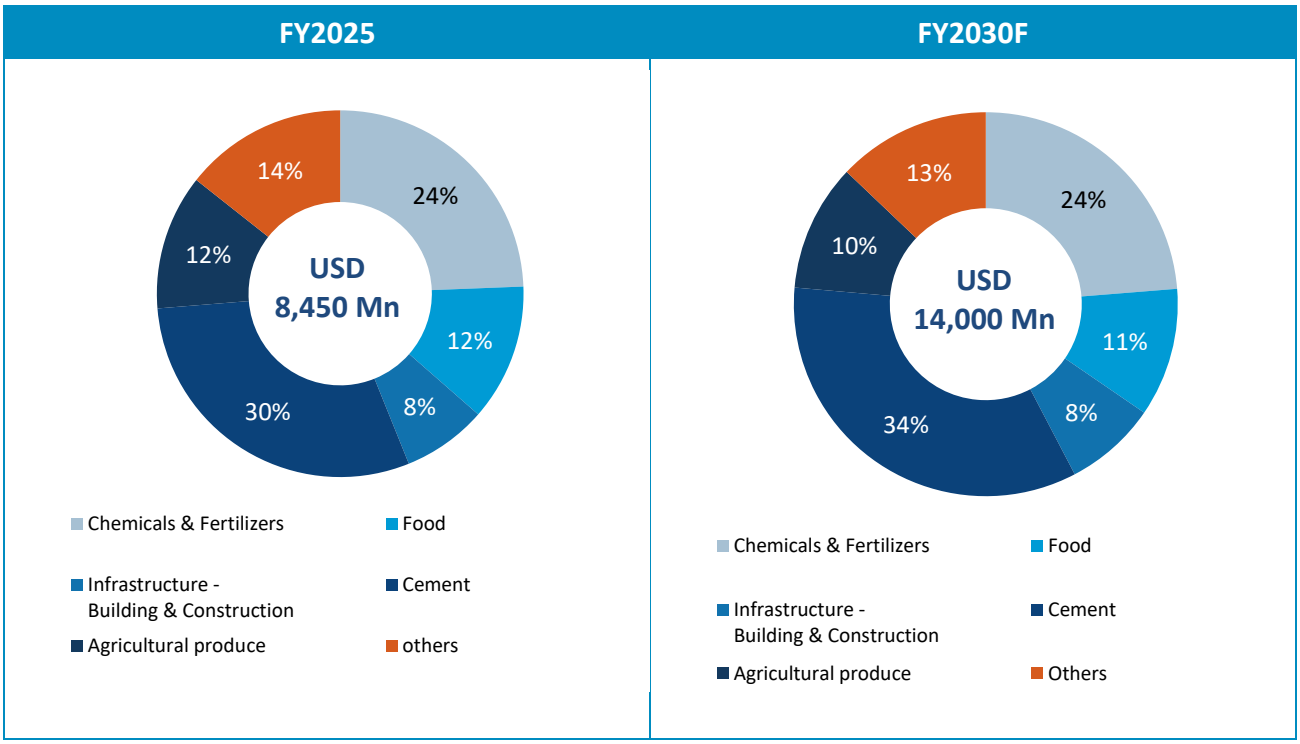
6.1.3. Industry Usage Split of Woven Raffia Market

Exhibit 6.5: Raffia Market split by Industrial Usage, By Volume, India, FY 2025- 2030F



Source: Frost & Sullivan Analysis

Exhibit 6.6: Raffia Market split by Industrial Usage, By Value, India, FY 2025- 2030F



Source: Frost & Sullivan Analysis

In India, the cement industry is the largest consumer of polypropylene (PP) woven sacks, accounting for approximately 30% of the market by value in Fiscal 2025. PP woven sacks are the preferred packaging solution in this segment due to their high stiffness, heat resistance, and dimensional stability, making them ideal for packing hot cement. The chemicals and fertilizer segment holds a significant 25% share of the Indian Raffia market. While laminated HDPE bags have traditionally dominated this segment due to superior outdoor durability, polypropylene (PP) woven sacks are gaining ground. This shift is driven by the availability of cost-effective UV stabilizers and faster production rates achievable with PP, making it an increasingly preferred material for fertilizer packaging.

The agricultural produce segment is a major and growing consumer of PP/HDPE woven sacks in India, accounting for a substantial share of the Raffia market. These sacks are widely used for packaging grains, pulses, oilseeds, vegetables, and other farm produce due to their durability and cost-effectiveness.

6.2. Industry Overview of the Indian woven Raffia FIBC Market

Flexible Intermediate Bulk Containers (FIBCs)—also known as jumbo bagsare highly cost-effective packaging solutions for transporting and storing dry, flowable materials such as grains, chemicals, cement, and minerals. Made from flat or tubular polypropylene (PP) woven fabrics (coated or uncoated), they are designed to safely carry loads up to 2000 kg, depending on the required safety factor.

FIBCs are widely used across industries such as food, chemicals, pharmaceuticals, construction, and mining. Globally, key markets include the USA, Europe, Japan, China, Korea, India, and Africa.

India is a global leader in FIBC manufacturing and exports, with companies like Flexituff Ventures, Rishi FIBC, Emmbi Industries, and Kanpur Plastipack among the major players

Although the Indian market constitutes only about 13% of global FIBC consumption, India holds a dominant position in exports, accounting for over one-third of global trade and nearly 25% of total global output. While exports continue to dominate production, domestic demand is rising steadily, especially in the construction, chemical, and mineral sectors, due to a shift away from smaller woven sacks.

Future of FIBC in India

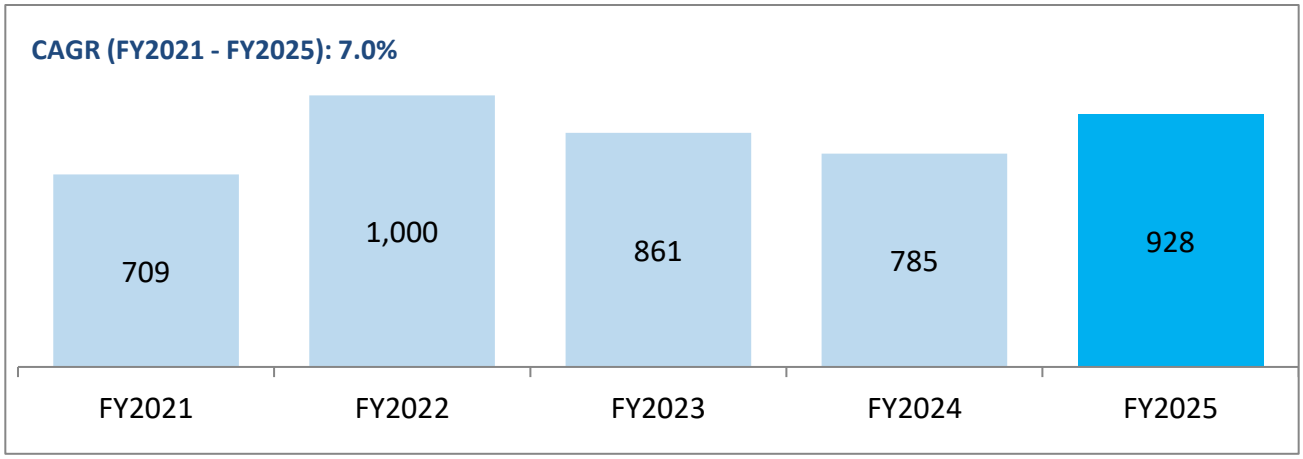
India stands as the largest exporter of FIBCs globally, with major shipments directed to North America, Europe, and Australia. Over the past two decades, the Indian FIBC industry has witnessed remarkable growth. This progress is driven by several key factors: abundant availability of raw materials (including specialty high-tenacity grades), adoption of advanced manufacturing technologies, a skilled workforce—particularly in FIBC fabrication—and adherence to stringent

quality standards. India has also built a strong global reputation for consistently delivering high-quality FIBCs.

On the domestic front, the demand for FIBCs is gaining momentum. With rising labor costs in India, there's a gradual shift from manual handling of small bags toward more mechanized packaging systems that favor FIBC usage, mirroring trends in developed markets.

6.2.1. India Raffia FIBC – Export Market Size by Value

Exhibit 6.7: India FIBC Export Market Value from FY2021- 2025 (USD Mn)



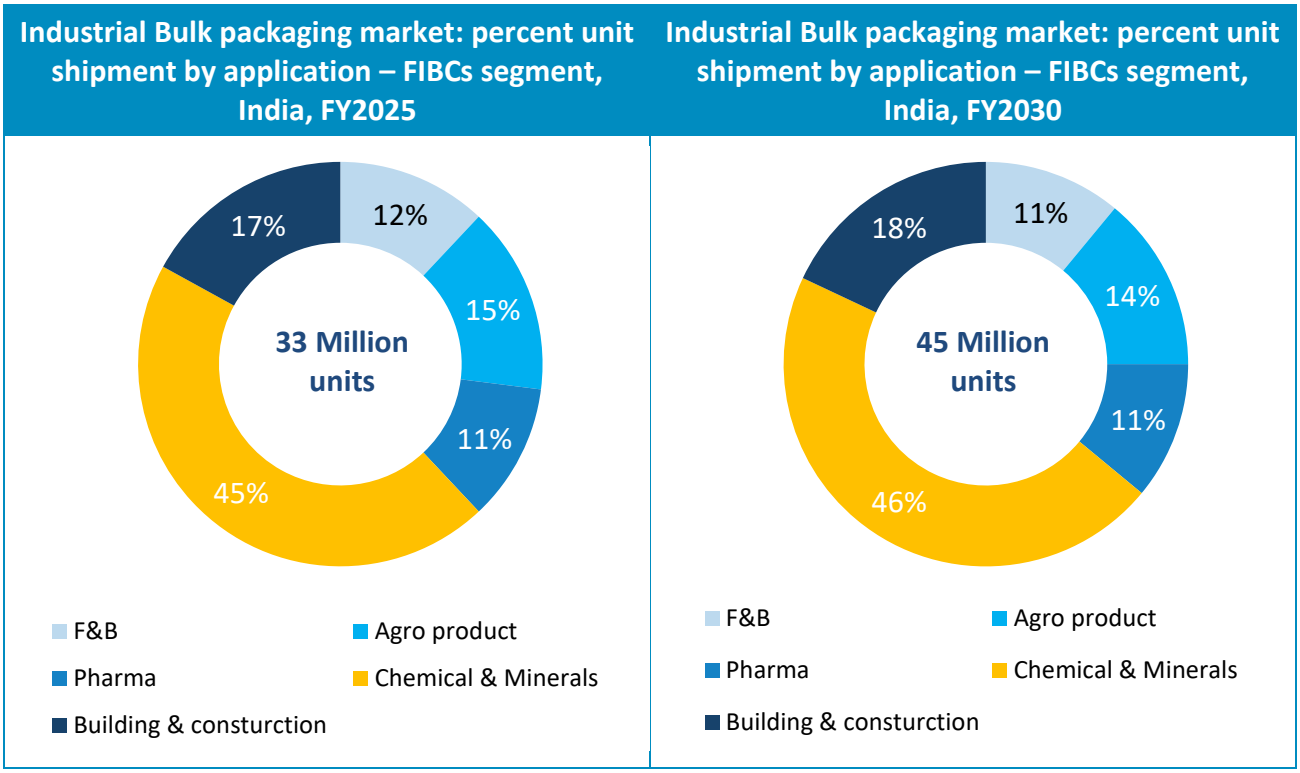
Source: Frost & Sullivan Analysis and Plexconcil

India continues to witness robust global demand for its FIBC exports, particularly from key markets like North America, Europe, and Australia. The country's strong reputation for delivering high-quality, cost-effective, and compliant packaging solutions has positioned it as a preferred supplier in the global market. This sustained export momentum remains a key driver of growth for the Indian FIBC industry.

In addition, as of 2025, India has the second largest market for woven sack machines, backed by the fact that India is the largest FIBC exporter in the world and witnesses strong domestic demand from agriculture, fertilizer and cement sectors.

6.2.2. India Woven Raffia FIBC – Unit Shipment by Application

Exhibit 6.8: FIBC Segment, Unit shipment by application: India, FY2025 -FY2030



By FY2025, the industrial bulk packaging market for FIBCs in India is largely driven by the Chemicals & Minerals segment, accounting for the highest share. However, by FY2030, while Chemicals & Minerals will continue to hold a significant portion, its share is expected to decline relatively as other applications grow. The Buildings and Construction segment is set to witness notable expansion in the forecast period. Agriculture and fertilizers also contribute steadily, with a shift toward bulk handling practices boosting FIBC adoption. The agro-products segment is projected to grow further by 2030, supported by rising hygiene standards and demand for food-grade packaging.

6.3. Key Growth Drivers of Indian Woven Raffia Market

Rise in Trade & Chemical Exports: India's expanding trade activities and the "Make in India" initiative are boosting demand for woven sacks in sectors like chemicals, fertilizers, and minerals. As Indian specialty chemical manufacturers scale up to serve global markets—especially amid supply chain shifts away from China—raffia bags are increasingly preferred for secure, large-volume transport.

Shortage in Jute Supply for Foodgrain Packaging: Frequent disruptions in the jute industry in India such as raw material shortages, labor issues, and price spikes have led to inconsistent supply of jute bags for foodgrain packaging. This has made HDPE/PP woven sacks a necessary alternative, even in

areas covered by the Jute Packaging Materials Act (JPMA), especially for meeting large-scale demand in FCI and agri-logistics. India has a large and expanding woven Raffia market which is driven by the increasing substitution of jute bags.

Sustainability and Circular Economy Alignment: PP and HDPE woven sacks are gaining traction in India due to their lower carbon footprint, recyclability, and energy-efficient production. They consume less water, chemicals, and energy compared to jute or paper bags, and their lightweight nature reduces transportation emissions, positioning them as eco-friendly and cost-effective packaging alternatives.

Government Push on Infrastructure Investments: With India targeting a $10 trillion economy by 2032 and allocating ₹100 lakh crore+ for infrastructure development, demand for cement, construction materials, and their packaging will surge. This creates a direct growth opportunity for raffia-based woven sacks, especially in cement, aggregates, and bulk material handling.

Key demand factors across Industries: Cement drives the highest demand, fueled by infrastructure and housing expansion. The food and agriculture segment covering rice, wheat, pulses, and oilseeds shows consistent growth with rising domestic production and exports. Chemicals and fertilizers are key contributors as India scales up manufacturing and global shipments. Infrastructure projects continue to boost the consumption of woven sacks. Overall, demand is rising due to the material's strength, lightweight nature, and suitability for bulk and export packaging.

In addition, per capita wheat consumption in Asia is expected to increase from 60 kg in 2024 to approximately 74 kg by 2030, driven by rising demand for processed cereal-derived products such as pastries and noodles in countries including India, Korea, Vietnam, Indonesia, and Thailand. Similarly, global sugar and sugar confectionery exports stood at US $2.62 billion in 2024, and India was the second-largest global producer and exporter of sugar and sugar confectionery, accounting for roughly 11–13% of global exports. . India’s cement production increased from 426.29 million tonnes in FY2024 to about 453.0 million tonnes in FY2025 and is expected to grow at 6–7% annually over the next five years, supported by infrastructure spending, housing demand, and capacity additions.

6.4. Recycling and Sustainability in India Woven Raffia Market

The Indian woven raffia market, dominated by polypropylene (PP) and high-density polyethylene (HDPE) sacks, is under increasing pressure to align with global sustainability goals.

Current Recycling Practices

While PP/HDPE raffia sacks are recyclable, actual recycling remains limited due to contamination, multilayer coatings, and informal waste collection systems. Recycled material is mostly used in low-grade applications such as plastic furniture, construction plastic, and secondary packaging.

Challenges in Circularity

The sector faces issues like lack of traceability in sourcing post-consumer resin (PCR), inconsistent quality of recycled PP, and poor recycling infrastructure. Small and medium enterprises (SMEs) especially struggle due to limited capabilities and weak enforcement of producer responsibility norms.

Regulatory Landscape

India's Plastic Waste Management (PWM) Rules, 2022, mandate Extended Producer Responsibility (EPR) for plastic packaging, including woven sacks. However, compliance remains low among SMEs due to cost barriers, lack of awareness, and inadequate infrastructure.

Sustainability Push by Leading Players

Leading manufacturers are adopting closed-loop recycling, investing in automatic reprocessing lines, and using recycled PP in non-critical sack layers. Some are exploring innovations like mono-material designs and bio-based or compostable materials, though these are still in early stages due to high costs.

6.4.1. Domestic Capacity of PP Recycling - Woven Sack Production

India recycles around 3.4 million tons of plastic waste annually, with polypropylene (PP)—a key material in woven raffia sacks—accounting for 1.1 to 1.3 million tons of recycling capacity. However, actual utilization remains below potential due to collection inefficiencies and inconsistent material quality. Major recycling hubs include Gujarat (Dhoraji, Morbi), Maharashtra (Bhiwandi, Vasai), Tamil Nadu (Chennai region), Delhi-NCR, and Punjab.

Recycled PP (rPP) is widely used in the woven sack industry, particularly for secondary packaging like sandbags, and low-strength applications in agriculture and industrial sectors.

Scaling the use of rPP faces several challenges, including the absence of uniform quality standards, poor traceability of post-consumer waste, and contamination from pigments and fillers that affect processing and strength. Moreover, there is limited integration between organized recyclers and woven sack manufacturers, hindering efficient supply and quality control.

In response, larger manufacturers are investing in in-house recycling capabilities to close the loop and increasingly adopting virgin-recycled PP blends to meet compliance without compromising on performance. Some early-stage pilots are exploring food-grade rPP for woven applications, although commercialization is still limited.

Regulatory mandates under India's Plastic Waste Management (PWM) Rules, 2022, particularly the Extended Producer Responsibility (EPR) norms, are pushing producers to demonstrate the usage of recycled content. At the same time, rising global demand for traceable and sustainable packaging—especially from export markets—is prompting investment in higher-quality, certified rPP woven sack solutions.

6.4.2. Government Initiatives in Plastic Waste Management and EPR

1.Plastic Waste Management Rules, 2016 (Amended in 2021 & 2022)
These rules form the backbone of India's plastic regulation. They mandate segregation, collection, and recycling of plastic waste. While multi-layered packaging is under scrutiny, reusable woven sacks are exempt. The amendments have expanded the scope of compliance and accountability.

2. Extended Producer Responsibility (EPR) Guidelines – 2022
Part of the PWM framework, these guidelines make producers, importers, and brand owners (PIBOs) responsible for managing plastic packaging waste. Woven sack makers fall under Category II (flexible packaging) and must meet annual recycling and recycled content targets via CPCB's EPR portal.

3. Swachh Bharat Mission 2.0 (Urban) – Plastic Waste Component
Launched in 2021, it focuses on strengthening urban waste systems. It promotes Material Recovery Facilities (MRFs) and formal integration of informal waste pickers to improve plastic segregation and recycling efficiency, including packaging waste like woven sacks.

4. National Dashboard for EPR Registration (CPCB)
This centralized portal enables real-time tracking of EPR compliance. PIBOs must register and report on recycling targets, recycled content usage, and authorized recyclers, bringing greater transparency to circular packaging practices.

5. Single-Use Plastics (SUP) Ban – July 2022
India's SUP ban does not cover multi-use woven sacks, but it has increased scrutiny of all plastic packaging. This has encouraged sectors like FMCG and agriculture to shift toward recyclable and compliant woven solutions.

6. BIS Standards for Recycled Plastics (IS 14534:1998 & updates)
Though voluntary, BIS standards guide the safe use of recycled PP and HDPE. They are increasingly

adopted by exporters, EPR-compliant firms, and government agencies to ensure packaging quality and sustainability.

7. PLI Scheme for Textiles (Technical & Sustainable)
This scheme, focused on man-made fiber and technical textiles, indirectly benefits the woven sack sector. It supports investments in R&D and modern machinery that enhance the recyclability and sustainability of products like FIBCs.

6.4.3. Demand for Recycled Content Woven Sacks from Institutional Buyers

There is a growing shift among large institutional buyers—across FMCG, agriculture, cement, fertilizers, and retail logistics—toward the use of recycled-content woven sacks. Sustainability goals primarily drive this trend, Extended Producer Responsibility (EPR) mandates, and a broader push for circular packaging practices.

The demand for recycled polypropylene (rPP) woven sacks is rising, led by FMCG, retail logistics, agri-inputs, and cement sectors, with companies like HUL, IFFCO, and UltraTech adopting rPP to meet ESG and regulatory goals. Public sector buyers like FCI are also promoting sustainable packaging. EPR mandates, ESG commitments, export norms, and cost benefits drive this shift. However, wider adoption is limited by inconsistent rPP quality, lack of certification standards, and concerns over performance in critical applications.

6.4.4. Major Innovations and Trends in the Indian Woven Raffia Market

Shift Toward Lightweight & High-Strength Sacks

Manufacturers are adopting high-tenacity PP tapes and advanced weaving technologies to produce thinner yet stronger sacks.

Sustainability-Driven Product Development

There is a growing push for recyclable, mono-material woven sacks that eliminate lamination, making recycling easier. Blended sacks with partially recycled PP are being introduced to meet regulatory demands while maintaining strength. Though still emerging, bio-based and compostable alternatives are also being explored for future scalability.

Given current climate change concerns and the global focus on sustainability, recycling, reusing, and repurposing materials such as single-use, non-biodegradable plastics, this market is relatively untapped and offers long-term growth potential.

Advanced Printing & Customization

Woven sack manufacturers are increasingly adopting flexographic printing, driven by demand from FMCG and retail buyers. Multicolor branding, QR codes, and traceability tags are being integrated into packaging to enhance visibility, tracking, and product identity.

UV Protection & Anti-Slip Features

To meet storage and logistics challenges, anti-slip coatings and embossed surfaces are also being adopted to improve safety and stackability during warehousing and transit.

Automation & Process Modernization

The industry is moving toward fully automated production lines, including robotic handling, stitching, and quality inspection systems. Digital tools like vision-based inspection and tensile strength monitoring are enhancing consistency, throughput, and compliance in large-scale facilities.

6.5. Threats and Challenges to the Indian Woven Raffia Market

Highly Fragmented Industry: The Indian woven sack industry is dominated by small and mid-sized players with limited financial and technical resilience. This fragmentation leads to intense price competition, low entry barriers, and reduced capacity for innovation. Most players lack scale, R&D investment, and access to advanced production technologies, making the industry vulnerable to market and policy shocks.

Raw Material Price Volatility: Dependence on imported polypropylene and crude-linked price fluctuations exposes players to margin instability.

Environmental Regulations and Sustainability Push: Plastic packaging faces increasing regulatory scrutiny, with rising demand for biodegradable alternatives and circular economy alignment, adding compliance burdens.

Competition from Alternative Materials: Paper, jute, and biodegradable non-woven fabrics are increasingly preferred in retail, food grains, and agri-packaging, posing a threat to traditional raffia-based sacks.

Limited Recycling Ecosystem: The Indian woven raffia market suffers from a weak recycling framework, with limited organized collection, segregation, and processing of used polypropylene bags. Most recycling is handled by informal players with low-end technology, resulting in poor-quality recycled output. This discourages large manufacturers from reusing material, thereby keeping circularity levels low. Additionally, there is minimal regulatory push or incentives to promote recycled content in packaging. As sustainability and ESG norms tighten globally, this gap could affect both domestic compliance and export viability.

The cyclical nature of the agriculture, textiles and construction industries, both globally and in India means that the demand for machinery and equipment for manufacturing technical textile may vary. In particular, the agricultural sector is inherently seasonal and is further impacted by factors including agricultural commodity prices, costs of fertilizers and adverse weather conditions. Similarly, the construction sector is prone to seasonality owing to factors such as the inconsistent real estate market, economic downturns that cease construction activity, among others. These segments are also affected by macro-economic conditions.

Chapter 7: Global Woven Raffia Machines Market

Global Woven Raffia Machines Market

7.1. Overview – Global Woven Raffia Machines Market

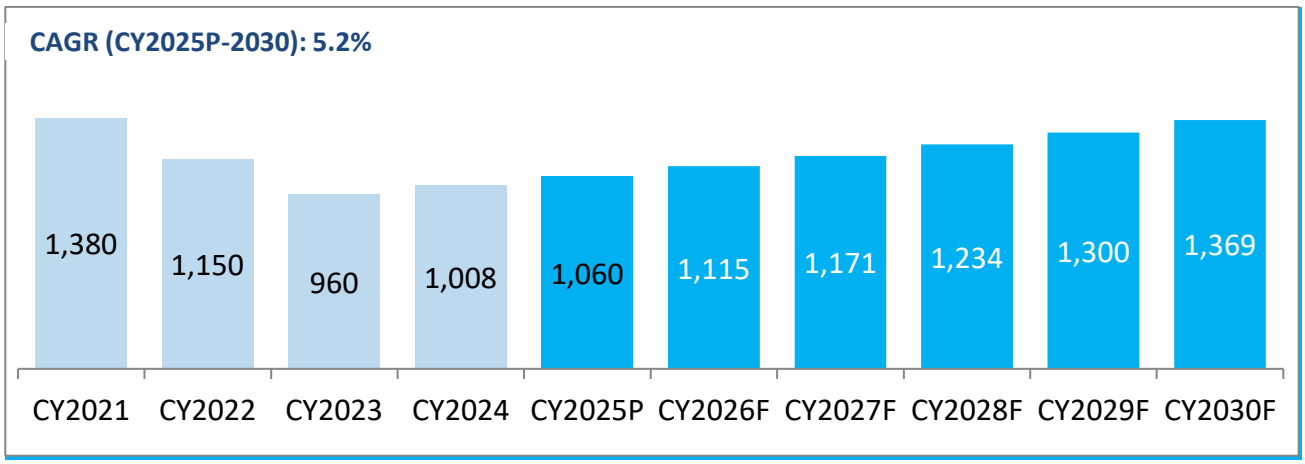
A woven raffia machine consists of a range of processing and weaving machines and equipment, which mainly use PP or HDPE as raw materials to produce different types of Packaging and non-packaging materials. Packaging is classified into woven bags, FIBC/Jumbo bags, and non-packaging materials, which are further classified into Wrapping, Geotextile, Tarpaulin, etc. The industry is currently in its growth phase and exhibits consolidation at the global level, with Starlinger & Co. GmbH and Lohia Corp Limited emerging as the two dominant players in terms of scale of operations. Growth is driven by rising demand in packaging, agriculture, and construction, especially in the Asia-Pacific region, which dominates production due to low labor costs and high end-user demand. Advances in automation, digital controls, and sustainability features are shaping machine upgrades. The market is gradually shifting toward smart factory integration and the production of customized, high-strength fabrics.

The machine manufacturers are contributing to the innovation part by providing advanced machinery to produce lightweight, high-strength woven sacks and bags for industrial packaging. Lohia Corp Limited operates a Technical Training and Research Centre in Kanpur, Uttar Pradesh, which stands out within the global woven raffia machinery ecosystem.

The major types of equipment include Tape Extrusion / Stretching Lines, Winders, Circular Looms, Lamination Machines, Coating Machines, Printing Machines, Bag Conversion / FIBC Conversion machines etc.

7.2. Global: Woven Raffia Machines Market Forecast

Exhibit 7.1: Woven Raffia Machines Market Forecast, By Value ($Mn), Global, CY 2021-2030



Source: Frost & Sullivan Analysis

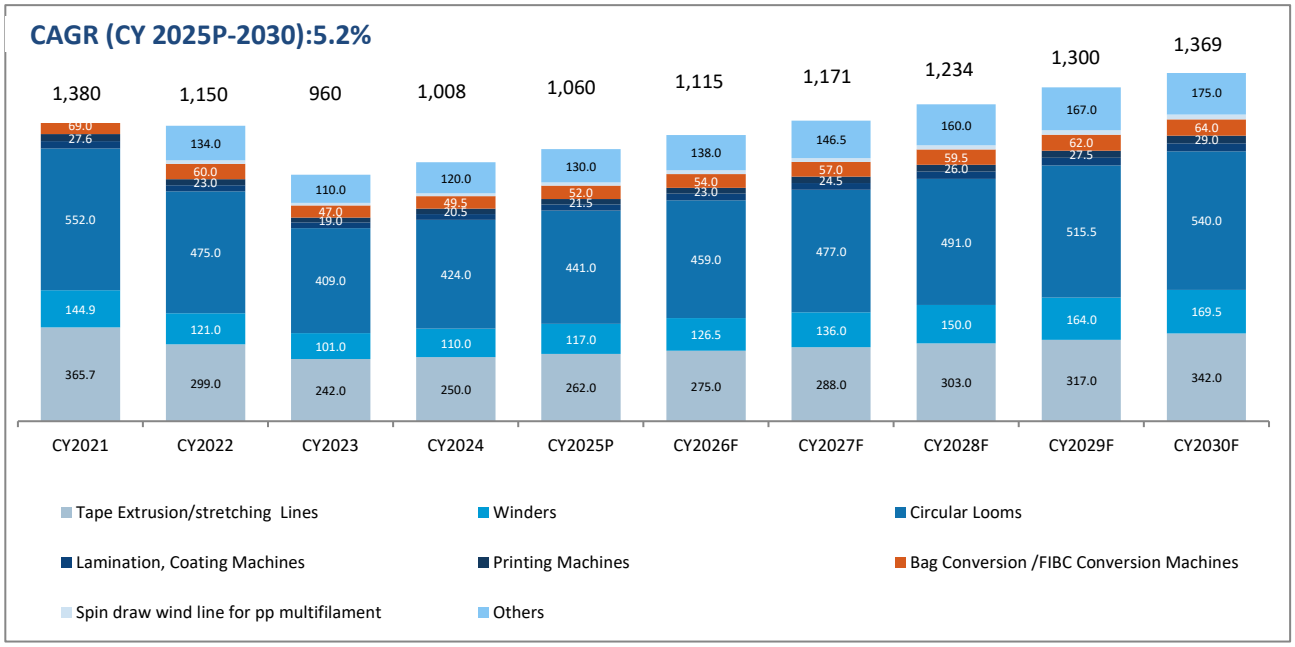
Globally, the market for woven raffia machines was estimated to be US$ 1,008 million in CY2024, and is expected to reach US$ 1,369 million in CY2030, at a CAGR of 5.2%. Increasing investments across global Infrastructure projects (Cement, Construction) and increasing usage of Raffia bags across different user segments (Food grains, Chemicals, Fertilizers, agriculture) is expected to support the machinery market growth from 2025-2030. This growth is also driven by increasing

industrial modernization, supportive government policies, rising demand for automation and energy-efficient systems, and a likely replacement cycle across key sectors. Export potential and a push for smarter, compliant operations are further boosting market momentum in the forecast period.

Woven fabric machines are used in a wide range of packaging applications across various industries, including the packaging of cement, fertilizer, chemicals, polymer, food grain and minerals, as well as in the production of shopping bags, leno bags, flexible intermediate bulk containers ("FIBC") and container liners and are also utilized in a variety of non-packaging applications, such as wrapping fabric, roof underlayment, lumber wrap, pond liner, tarpaulin, geotextile, geogrid, ground cover, carpet backing, ropes and twines

7.3. Global: Market Forecast by Product Segment & Regional Split

Exhibit 7.2: Woven Raffia Machines Market Forecast by Product Segment, By Value, Global, CY2021-2030 (USD Mn)



Source: Frost & Sullivan Analysis

Machinery for the raffia industry can be broadly classified into two categories based on the stages of manufacturing:

1. **Woven fabric making stage** – This includes equipment used up to the stage of producing woven fabric, such as tape extrusion lines, winders, and circular looms.

2. **Processing and Conversion stage** – This category covers all downstream equipment used for cutting, printing, stitching, and other finishing operations that convert woven fabric into final products like sacks or bags.

In the global market, the growth trajectory of fabric machinery varies by stage. Machinery up to the woven fabric stage, valued at $780.0 million, is growing at a CAGR of 5.1%, while machinery for processing and conversion, valued at $228.0 million, is growing slightly faster at a CAGR of 5.8%. This is primarily driven by increased automation in bag conversion machines and the growing demand for diverse bag types including bulk packaging, laminated and printed bags, as well as retail and shopping bags.

The woven raffia machinery market is experiencing robust and diversified growth across various equipment categories. Circular looms remain the largest segment, driven by rising global demand for woven sacks and FIBCs in cement, fertilizer, and agro-packaging sectors. Tape extrusion lines, along with looms, have also shown steady expansion, reflecting investments in backward integration and in-house tape production for cost efficiency. Meanwhile, recycling machines are gaining traction as manufacturers adopt sustainable practices and strive for raw material circularity. Notably, bag conversion and FIBC machines have seen sharp growth, indicating India's increasing role as a global supplier of high-value packaging solutions. Supporting equipment, such as winders, is growing in line with overall capacity additions, while lamination and printing machines exhibit stable but slower growth, suggesting market maturity or outsourcing trends. Niche segments, such as multifilament spin draw lines, are gradually increasing, signaling a shift toward technical textiles and product diversification. Overall, the market reflects a clear transition from volume-based expansion to value-added, export-oriented, and sustainability-driven investments.

Exhibit 7.3: Woven Raffia Machines Market Forecast by Region, By Value, Global, CY2021-2030 (USD Mn)

	Years (CY)									
Regions/ Geography	**2021**	**2022**	**2023**	**2024**	**2025P**	**2026F**	**2027F**	**2028F**	**2029F**	**2030F**
Latin America	81.8	74.0	67.0	69.0	72.0	74.0	76.6	78.2	81.0	87.5
MENA	48.3	41.0	36.0	37.5	39.0	41.0	42.3	46.0	48.3	50.0
Sub Saharan	27.6	24.0	20.0	22.0	23.0	24.5	26.0	28.0	29.8	30.5

Russia & CIS Countries	131.1	116.0	98.0	104.0	108.0	114.0	123.0	132.0	140.0	143.0
Asia pacific	750.0	617.0	517.0	539.0	576.0	598.0	622.0	655.2	689.0	741.0
Others	341.2	278.0	222.0	236.5	242.0	263.5	281.1	294.6	311.9	317.0
Total	**1380.0**	**1150.0**	**960.0**	**1008.0**	**1060.0**	**1115.0**	**1171.0**	**1234.0**	**1300.0**	**1369.0**

In Asia Pacific, China is the largest consumer of woven fabric, primarily due to its dominant 55% share in the global cement industry, as well as significant demand from the chemical and agricultural sectors. This strong domestic need, coupled with its status as the leading exporter of woven sacks and FIBCs to Asia, the USA, Africa, and Latin America, has made China a global hub for woven sack production. India stands as the second-largest market for woven sack machinery, supported by its position as the world's leading exporter of FIBCs and strong domestic demand from the agricultural, fertilizer, and cement sectors. Key Indian players, such as Lohia Corp Limited, dominate the machinery landscape. In Latin America, demand is primarily driven by agriculture, with minimal contributions from cement and chemicals. The MENA and Sub-Saharan African regions exhibit modest usage of woven sacks, driven mainly by agricultural and petrochemical needs. Globally, established companies like Starlinger & Co. GmbH and Lohia Corp Limited have long supplied woven raffia machinery. However, rising demand in countries like India and China has led to the emergence of new regional machine manufacturers. Growth in woven sack machinery is now more prominent in developing markets such as ASEAN and Africa.

7.4. Key Technological Trends Adopted in the Global Market

The global market for woven raffia machines is undergoing a steady technological transformation, driven by demands for efficiency, sustainability goals, and smart manufacturing. Below are the key trends observed:

Shift Towards High-Speed Looms and Automatic Conversion Lines

Manufacturers are increasingly investing in high-speed circular and flat looms that enable higher productivity with better fabric consistency. Simultaneously, automatic conversion lines—integrating cutting, stitching, and printing—are reducing manual intervention and operational delays. These upgrades improve throughput and reduce labor dependency, especially in export-driven factories.

Replacement Cycles in Existing Plants

A large installed base of older-generation looms, especially in Asia and Eastern Europe, is now undergoing replacement or retrofitting cycles. Aging machinery is being phased out in favor of

digitally enabled, high-efficiency models, driven by buyer pressure, quality certification needs, and cost optimization goals.

Adoption of Energy-Efficient, Lower-Waste Machinery

Newer machines emphasize power-saving drives, optimized material feed systems, and designs that minimize fabric waste. This supports sustainability goals, helps reduce input costs, and improves compliance with emerging ESG norms, especially for large exporters to Europe and North America.

Impact of Government Technology Upgradation Incentives

Countries like India, China, and Vietnam are offering capital subsidies, import duty relaxations, and cluster-based technology upgradation schemes to encourage modernization. For example, the Indian government's TUFS (Technology Upgradation Fund Scheme) has spurred significant investments in modern weaving and conversion equipment.

Penetration of Automation, IoT, and Industry 4.0 Features

Smart looms and ancillary machines are increasingly integrated with IoT sensors, SCADA interfaces, and predictive maintenance systems. These features enable real-time monitoring, quality control automation, and reduction in unplanned downtimes, enhancing operational transparency and plant efficiency.

Demand for Customization and Versatility

Buyers now seek machines capable of handling varied fabric widths, tensile strengths, and multi-layer configurations for diversified applications like geotextiles, agro-nets, and FIBCs. This is pushing machine builders to design more modular and flexible systems.

The woven raffia machinery segment is aligning with global trends of automation, sustainability, and efficiency. While Asia leads in production volumes, global competitiveness will increasingly depend on how fast manufacturers adopt smart, integrated, and eco-compliant technologies across their plant infrastructure.

7.5. Recycling Trends and Sustainability Initiatives in Woven Raffia

The global woven raffia industry primarily based on polypropylene (PP) and polyethylene (PE) is seeing a strong pivot toward sustainable practices, driven by regulatory pressure, buyer expectations, and cost efficiency. Below are the three key sustainability themes:

i. Role of Recycled Polypropylene (rPP) in Woven Raffia Production

- Recycled polypropylene (rPP) is increasingly used as a partial or full substitute for virgin PP granules in raffia tape production.
- Post-industrial and post-consumer waste streams are processed into rPP pellets, then re-extruded into tapes or fabrics.
- Advances in extrusion technology have made it possible to blend recycled content without compromising tensile strength or UV resistance
- Some regions (like the EU) now encourage mandatory recycled content, pushing raffia manufacturers to adapt.

ii. Adoption of Recycled Input Materials by End-User Industries

- Large buyers in cement, agriculture, and retail packaging are beginning to demand woven sacks with certified recycled content.
- Cement companies in Europe and India have piloted bags with up to 30–40% recycled PP content.
- Agro-input firms are adopting recycled raffia for temporary packaging and field-use sacks, were aesthetics matter less.
- Retail and logistics firms are exploring woven FIBC made from rPET and recycled PP blends as reusable packaging alternatives.

ESG goals, green branding, and cost competitiveness in bulk packaging often drive this shift.

iii. Impact of Circular Economy Policies on Recycled Woven Raffia Demand

Global and national circular economy frameworks are accelerating the transition:

- The EU Green Deal, India's EPR (Extended Producer Responsibility) rules, and plastic packaging waste mandates are encouraging closed-loop systems.
- As a result, demand is rising for recyclable and recycled-content raffia bags, particularly in industries like fertilizers, cement, and FMCG.
- Waste collection and sorting ecosystems are improving in several countries, enabling better feedstock quality for rPP production.

Many woven bag manufacturers are also setting up in-house recycling units or partnering with recyclers to recover used sacks and FIBCs, reprocessing them into granules, thereby creating a semi-circular supply chain.

Recycled polypropylene is no longer just a low-cost alternative—it is becoming a strategic material in raffia production. With buyers and governments pushing for lower carbon footprints and higher recyclability, the industry is rapidly integrating the use of recycled inputs, waste collection, and sustainability certifications into its core operations.

7.6. Overview – Supply Chain for Global Woven Raffia Machines Market

The global supply chain for woven raffia machines is multi-layered and increasingly technology driven. It begins with the sourcing of precision-engineered components such as motors, PLCs, and control units, primarily from countries like Germany, Japan, and China. Manufacturing hubs are concentrated in Europe (for high-end automated machines) and Asia (for cost-effective, high-volume models). Machines are typically exported in modular formats through agents or direct OEM channels, with lead times ranging from 2 to 6 months.

After-sales services, including installation, operator training, and maintenance, play a critical role, supported by regional service hubs and remote diagnostic platforms. A growing trend is the retrofitting of older machines with automation and energy-efficient systems. The supply chain is also adapting to localization efforts, digital service integration, and resilience strategies following the COVID-19 pandemic, with OEMs focusing on end-to-end lifecycle support to stay competitive in a sustainability-conscious global market.

7.7. Growth Drivers – Global Woven Raffia Machines Market

a. Global Ban on Single-Use Plastics

With countries like India, UK, US, Russia, and Australia enforcing bans or taxes on single-use plastics, there's a significant shift toward durable, reusable packaging solutions. Retailers such as Lidl & Aldi (Germany) have already started replacing disposable bags with woven plastic alternatives—a trend expected to grow globally. This regulatory push is accelerating demand for woven bag production, thereby boosting machinery sales.

b. Shortage of Jute Bags

Jute bags, traditionally used for agriculture and food grain packaging, are facing a supply crunch, particularly in South Asia. As agricultural output increases due to modern farming techniques, the gap in packaging needs is being met by woven bags, which are more scalable and readily available. This shift is driving demand for new machinery to meet growing order volumes.

c. Boom in the Global Construction Industry

The global construction market is projected to grow from USD 10.7 trillion in 2020 to USD 15.2 trillion by 2030 (42% increase). As cement and allied industries expand production to support this boom, so does the demand for durable bulk packaging, especially woven sacks. With over 60% of woven bag demand coming from the construction sector, machine manufacturers are scaling up to meet future production needs.

d. Rising Demand in Agriculture & Fertilizers

The global fertilizer demand is projected to grow from 199 MMT in 2021 to 240 MMT by 2030, alongside increased agricultural output. This growth translates into higher consumption of fertilizer-grade and agri-input woven bags, which are lightweight, UV-resistant, and cost-efficient. As a result, machinery tailored for woven fabric agro-packaging is witnessing increased investment and upgrades.

7.8. Threats and Challenges for the Global Woven Raffia Machines Market

Environmental Regulations & Anti-Plastic Sentiment - Despite being reusable, woven bags are still grouped under broader plastic ban or negative perceptions in many regions. This may limit market growth, particularly in the food grains and consumer packaging sectors, indirectly affecting machinery demand.

High Capital Costs for Advanced Machinery - Automation-enabled and energy-efficient machines come at a premium. For many small and mid-sized manufacturers in Asia, Africa, and Latin America, the upfront investment is a barrier without adequate financing or subsidies.

Competition from Alternative Materials - The growing adoption of biodegradable, paper-based, and jute-based packaging in eco-sensitive markets poses a long-term substitution threat to woven bags, reducing the demand for related machinery.

Raw Material and Component Price Volatility - Fluctuating prices of raw materials, electronic components, and motion systems directly impact machine pricing and profitability for both OEMs and buyers, especially during global supply chain disruptions.

Skilled Labor Shortages for Machine Operation - Modern weaving and conversion machines require technical expertise; however, many regions face a shortage of trained operators and maintenance staff, which limits the productive use of advanced machinery.

7.9. Competitive Overview - Global Woven Raffia Machines Market

The Global Woven Raffia Machinery Market is moderately consolidated, with around 30+ active players globally. The market is primarily dominated by manufacturers from Europe, India, and China, which collectively account for most global exports. China and Taiwan alone host over 12 suppliers, catering to both domestic and international demand with a wide range of machinery types. These three regions serve as the key manufacturing and export hubs for woven Raffia machines worldwide.

Key players in the global market include Starlinger & Co. GmbH, Lohia Corp Limited, Yongming Machinery, Hengli Machinery, Tianfeng Plastic Machinery, Polystar, and JP Extrusiontech, among others.

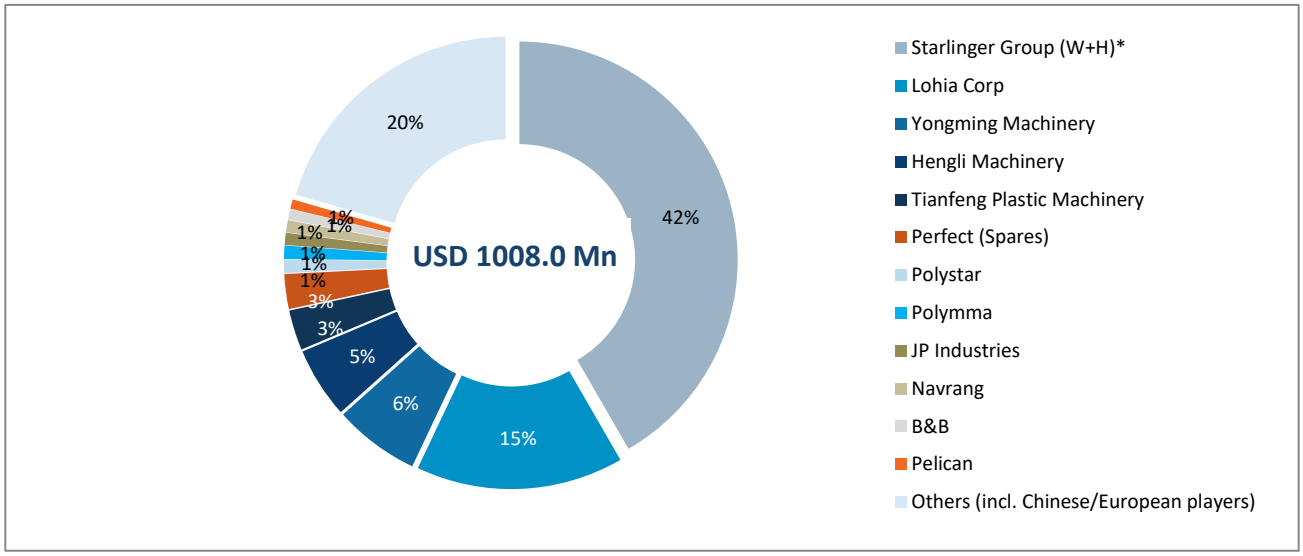
Alongside globally established players like Starlinger & Co. GmbH, Lohia Corp Limited holds a leading position in the raffia machinery industry, ranked among the leading manufacturers worldwide by revenue in CY2024.

Entry Barriers

The woven raffia machinery industry has high entry barriers, primarily due to the complex production processes, the need for technical expertise, and large infrastructure investments. Strong R&D capabilities, long training cycles, and deep customer loyalty further restrict new entrants. Many established companies offer highly customized solutions, creating additional differentiation. Since buyers prefer long-term, proven suppliers after rigorous evaluations, it becomes even harder for new players to enter and scale.

7.10. Key Players – Market Share Analysis

. xhibit 7.5: Global Market – Players' Market Share Analysis, CY2024



Note: *For Starlinger & Co. GmbH, the revenue figure includes both raffia machinery and recycling machinery segments

Lohia Corp Limited is among the leading global manufacturers of machinery and equipment for technical textiles, by revenue in CY2024, with a strong focus on solutions for producing PP and HDPE woven fabric and sacks ("Raffia").

In CY2024, Lohia Corp Limited ranked among the top global players by revenue, with a 15.4% share of the global woven raffia machinery market by value.

The overall market is USD 1,008.0 million across all machines in CY2024. European players, such as Starlinger & Co. GmbH, dominated the market earlier. However, they might face increasing competition since players from developing nations (from Asia) are catching up and becoming more technologically advanced. Starlinger & Co. GmbH and Lohia Corp Limited hold leading positions in the manufacture of machines for the global woven raffia machinery market in terms of revenue in CY2024.


New-Gen Products and Machineries

8.1. High Performance Fibres

High Performance Fibres (HPFs) are specialized synthetic fibres known for their exceptional strength, durability, thermal stability, and chemical resistance. These fibres are used in demanding applications across defence, aerospace, automotive, construction, medical, and industrial sectors. The HPF segment includes fibres such as Aramid (e.g., Kevlar, Twaron), UHMWPE (e.g., Dyneema, Spectra), Carbon Fibre, PBO, and high-grade Nylons like Nylon 66 and Nylon 6,6,6.

Market Overview

The global high-performance fibre market was valued at approximately USD 18.8 billion in 2025 and is projected to grow at a CAGR of 8–10%, reaching over USD 28 billion by 2030. This growth is fueled by increasing demand from the military, aerospace, and automotive sectors, along with the rise of renewable energy and advanced medical devices requiring durable and lightweight materials.

Key Segments and Applications

- Defence and Aerospace: Ballistic armour, aircraft composites, space structures (e.g., Aramid, UHMWPE, Carbon Fibre).
- Automotive: Lightweight panels, airbags, tyres, protective linings (e.g., Carbon Fibre, Aramid).
- Industrial: Conveyor belts, filtration fabrics, safety ropes, geotextiles (e.g., UHMWPE, Nylon 66).
- Medical: Surgical sutures, hernia meshes, implants (e.g., UHMWPE, PBT).
- Sports and Leisure: Helmets, racquets, high-performance sports gear (e.g., Carbon Fibre, PBO).

Types of Fibre – Industry Applications

- Aramid Fibre: Dominates military and safety markets due to heat/flame resistance.
- UHMWPE: Rapidly growing in defence and marine sectors; valued for lightweight and tensile strength.
- Carbon Fibre: Leading material for aerospace, sports, and EVs; high cost limits broader adoption.
- Nylon 66 and PBO: Key in industrial filtration, ropes, medical, and specialty applications.

India Market Outlook:

India's high-performance fibre market is still nascent but poised for rapid growth, backed by government policies like the National Technical Textiles Mission (NTTM) and Production Linked Incentive (PLI) schemes. Currently, India is heavily import-dependent, especially for UHMWPE and Carbon Fibre. However, local production capabilities are being prioritized in strategic areas like defence and aerospace, with DRDO, ISRO, and NTTM pushing for domestic innovation. ISRO has identified UHMWPE, Carbon Fibre, and Nylon 66 as critical to self-reliant space-grade materials development.

Strategic importance: UHMWPE's specific performance properties make it critical for aerospace, defence, and space-grade technical textiles—areas India is actively scaling up.

Policy-driven focus: The call by NTTM leaders, including complementary fibers like UHMWPE, highlights a deliberate push for indigenous innovation and manufacturing under the NTTM and PLI (Production Linked Incentive) schemes.

India's technical textiles roadmap now includes a clear mandate to develop UHMWPE capabilities - key for advanced domains like aerospace and defence. Supported by NTTM's emphasis and policy instruments, India is positioned to build homegrown competence in this high-performance fiber, aligning with Atmanirbhar Bharat and strategic self-reliance goals.

Global and Indian Players:

Global leaders in the high-performance fibre market include DuPont, Honeywell, Teijin, known for Kevlar and Nomex; DSM, the producer of Dyneema; and Toray, a major player in carbon fibre. Other key global players include Hexcel and Mitsubishi Rayon, both prominent in advanced composites and aerospace-grade materials. In India, the landscape is emerging, with Reliance Industries pursuing carbon fibre manufacturing, SRF Ltd specializing in Nylon 66 production, Lohia Corp Limited, through its subsidiary Leesona, is engaged in high-performance fibres solutions, and R&D initiatives in defence-grade technical fibres.

8.2. High Tenacity Monofilaments and Machinery Market

Industry Overview

The global demand for monofilament and strapping extrusion solutions is expanding due to their critical and high performance applications such as technical textiles, industrial filtration, premiumropes, precision fishing lines, artificial turf, and medical products. Similarly extrusion solutions for PET and PP Strapping are also gaining momentum as industries increasingly adopt automation for packaging operations involving the unitizing, securing and bundling of goods.

Manufacturers are increasingly seeking high-performance, efficient, and versatile extrusion lines that offer precision, reliability, and productivity. To address this, Lohia Corp Limited has partnered with OMGM S.a.S of Italy to form OMGM ExtrusionTechnik S.r.L., a joint venture focusing on extrusion plants for technical monofilament, straps, and ropes. Additionally, through its U.S. subsidiary Leesona Corp, LCL has acquired JJ Jenkins Inc.,further enhancing its position in the synthetic fiber and monofilament extrusion market.

Application-wise Segmentation

Monofilaments serve various sectors: consumer (e.g., bristles, brushes, 3D printing), sports and leisure (e.g., fishing lines, tennis racquets, artificial grass), industrial (e.g., filtration fabrics, reinforced concrete), agriculture (e.g., greenhouse lines, fencing wires), and medical (e.g., surgical sutures, hernia meshes).

Material-wise Segmentation

Key polymer types include HDPE, PET, PA (Nylon), PBT, PP, and specialty polymers like PEEK and PVDF. Each polymer is associated with specific applications such as household brooms, fishing nets, filtration, toothbrush filaments, and industrial brushes.

Global Market Size

The estimated global monofilament production capacity (excluding China) is 921,000 metric tons per annum, supported by approximately 1,820 extrusion lines. This is estimated to represent only 40–50% of the actual capacity, suggesting a total market size closer to 2.3 million tons and over 4,500 extrusion lines globally. The largest contributors by volume are HDPE/PP (535,340 MT), PET (184,040 MT), and Nylon 6 (139,640 MT). The market's growth is driven by rising demand from industrial filtration, 3D printing, technical textiles, medical, and packaging sectors. India and China continue to gain ground as major production hubs due to their competitive manufacturing costs and expanding industrial base.

Competitive Landscape

The global market includes established players across regions. Europe is home to premium technology providers like SIMA-D&S (Italy) and STC Spinnzwirn (Germany). Taiwanese firms such as Plasco and Kung Hsing, hold strong market positions. China features rising firms like Changzhou Leap and Rope Net. India contributes through players like Mahesh Twisto Tech, Aawadkrupa Plastomech, and JP Extrusiontech.

India's presence is strong with multiple contributors, collectively exporting over 30 lines per year. The global average is estimated at 18.5 lines/year, but true figures may be higher. Key destination countries include Indonesia, Vietnam, Turkey, Egypt, and the U.S.

The monofilament machinery market is segmented into three pricing tiers. At the top, Category A includes premium players like SIMA and STC, offering high-end machines with advanced features and a strong brand reputation. These machines require a significantly high investment and are typically chosen by customers seeking top-tier quality and long-term dependability. Category B comprises mid-range suppliers such as Plasco and Kung Hsing, who provide a balanced mix of technology and affordability, making them a popular choice in many developing markets. Category C consists of cost-focused manufacturers, primarily from India and China, offering basic or rudimentary technology with minimal post sales technical support. These cater to highly price-sensitive customers.

There exists a noticeable gap between the category A and B, an underserved space where a combination of reliable technology with reasonable cost would be highly attractive to value conscious buyers.

8.3. Raffia Recyclable Machinery

Market Landscape & Growth Drivers - Global Shifts in the Plastic Industry

The plastic industry is undergoing structural changes due to global legislation, shifting customer demand, bans on single-use plastics, and restrictions on waste imports and exports. Regions and countries like the EU and India have implemented aggressive mandates such as 30% recycled content in plastic bags and EPR rules that demand up to 50% recycling in rigid plastics. These regulations are pushing both innovation and obsolescence within existing plastic machinery. Initiatives such as the United Nations Sustainable Development Goal 12, which promotes 'responsible consumption and production' aim to ensure sustainable patterns of resource use.

Recycling Market Size & Opportunity

Plastic recycling has become an urgent and unavoidable global priority. While industry has already made significant progress by manufacturing advanced recycling (pelletising) machines for the in-house process waste of Raffia Industry, the greater challenge lies in tackling post-consumer waste - the plastics that have been used, discarded, and too often left to pollute our environment. Achieving a truly circular economy for plastics demands more. The post-consumer recycling of plastic waste involves collection, storage, sorting, shredding, washing, and pelletizing of waste. Whereas collection and storage are more of logistics management, the rest of the processes are industrial, done by the recycling sector.

India's recycling market is expected to grow from 9.9 million tons in 2023 to 23.7 million tons by 2032, with a CAGR of 10.24% and market value rising from USD 4.2 billion to USD 7 billion. Globally, the equipment market for sorting, washing, and extrusion is expected to increase from $1.5 billion in 2023 to $2.2 billion by 2030.

Key Market Drivers

Key growth drivers include government-mandated EPR policies, cost savings from recycled materials, and CSR-led initiatives by global brands like Coca-Cola. There's also a substantial shift from informal to formal waste management systems in regions like Southeast Asia and India.

Competitive Landscape

Competition Analysis (Extrusion Focus)

European players like EREMA, NGR, and Starlinger & Co. GmbH dominate the high-tech segment but face cost challenges. Other companies, such as Polystar of Taiwan, offer alternatives with quality compromises. Indian OEMs remain fragmented and localized; however, Lohia Corp Limited is bridging the quality-affordability gap with globally competitive, India-manufactured machines.

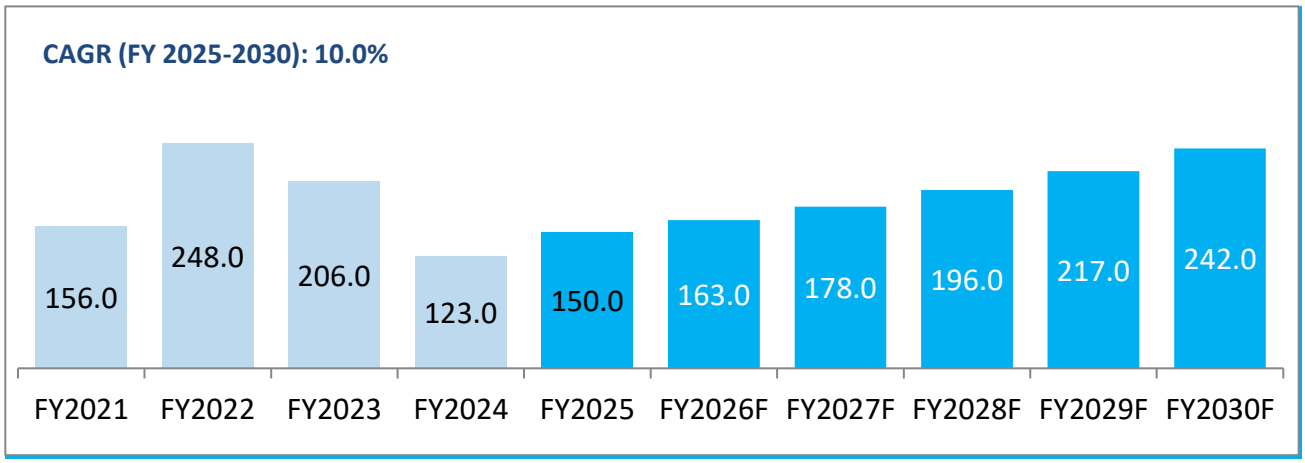
Chapter 9: Domestic Woven Raffia Machines Market

9.1. Overview – India Woven Raffia Machines Market

The India Woven Raffia Machines market is experiencing steady growth, driven by rising demand from key sectors like agriculture, cement, FMCG, and chemicals. India holds a strategic position as both a major consumer and exporter of woven sack and FIBC packaging, which fuels investments in domestic machinery. The market is supported by favorable government policies such as 'Make in India' and PLI schemes, along with increasing adoption of automated and energy-efficient machines aligned with Industry 4.0 standards. Indian companies like Lohia Corp Limited dominate the local manufacturing landscape, while global players continue to enter through joint ventures and localized production. The machinery segment includes extrusion lines, circular looms, bag-making units, and ancillary equipment. Overall, India's woven raffia machinery segment is expected to grow at 10.0% CAGR from FY2025-2030, with rising demand for smart, efficient, and versatile machines to meet both domestic and global packaging needs.

9.2. India: Woven Raffia Machines Market Forecast

Exhibit 9.1: Woven Raffia Machines Market Forecast, By Value ($Mn), India, FY2021-2030



The Indian market for woven raffia machines amounted to USD 150.0 million in FY2025 and is expected to reach USD 242.0 million in FY 2030, at a CAGR of 10.0%. Increasing investments in infrastructure projects and increasing usage of Raffia bags across different user segments such as food grains, chemicals, fertilizers and agriculture will support the machinery market growth.

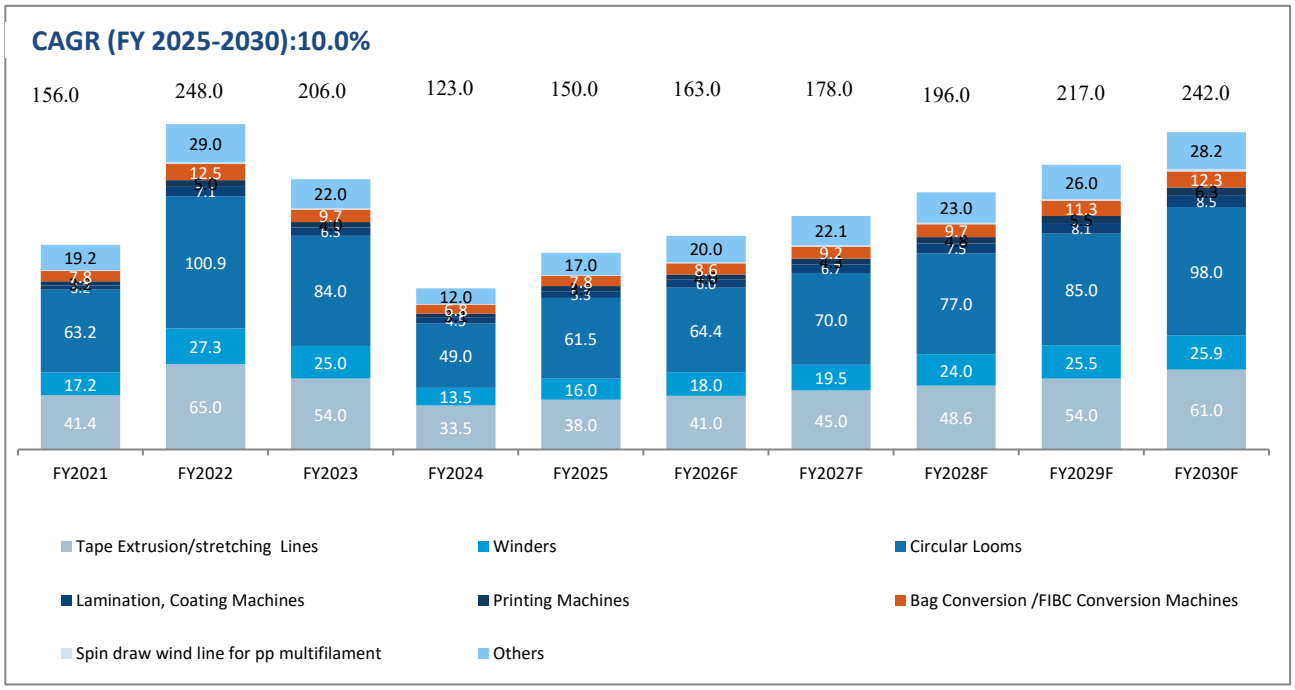
The market rebounded sharply, jumping from USD 156.0 Mn in FY2021 to USD 248.0 Mn in FY2022, reflecting pent-up demand and resumed industrial activity. However, growth dipped in FY2023 and FY2024, likely due to raw material price fluctuations, delayed capex cycles, or global supply chain disruptions.

The market's future sustained growth also indicates improving investment sentiment and modernization of India's processing capabilities, especially as manufacturers shift toward smarter and more sustainable production lines. For OEMs and suppliers, this period represents an

opportunity to invest in advanced, Industry 4.0-ready solutions that meet evolving industrial and export-oriented needs.

9.3. India: Market Forecast by Product Segment & Regional Split

Exhibit 9.2: Woven Raffia Machines Market Forecast by Product Segment, By Value, India, FY2021-2030 (USD Mn)



Source: Frost & Sullivan Analysis

The Indian market is primarily driven by two core segments: circular looms and tape extrusion/stretching lines, which collectively account for more than 65% of the total market value over the forecast period (FY2026-2030). Circular looms remain the dominant category due to their central role in producing woven fabrics used in bags, sacks, and industrial packaging, and are growing steadily.

In India, the growth trajectory of fabric machinery varies by stage. Machinery up to the woven fabric stage, valued at $117.0 million, is growing at a CAGR of 9.9%, while machinery for processing and conversion, valued at $33.0 million, is growing slightly faster at a CAGR of 10.5%. This is primarily driven by increased automation in bag conversion machines and the growing demand for diverse bag types, including bulk packaging, laminated and printed bags, as well as retail and shopping bags.

A notable trend is the rising importance of value-added machinery such as lamination & coating machines, bag conversion units, and printing machines, indicating a growing demand for fully

integrated, export-quality packaging solutions. This reflects India's shift from being just a fabric producer to becoming a global supplier of finished woven packaging products like FIBCs and laminated sacks. Additionally, specialty machines like spin draw wind lines for PP multifilament are seeing steady adoption, driven by the need for customized, high-strength yarns used in agrotextiles, geotextiles, and premium industrial applications. These trends collectively suggest that the Indian market is transitioning from basic woven fabric production toward a more advanced, diversified, and value-centric machinery ecosystem. Manufacturers and technology providers who can offer modular, automated, and energy-efficient machinery aligned with global quality standards will be best positioned to capitalize on this sustained market expansion.

9.4. Key Technological Trends Adopted in the Indian Market

Below are five critical technological trends influencing the domestic machinery market:

Shift Towards High-Speed Looms and Automatic Conversion Lines

The industry is witnessing a substantial shift from semi-automatic to high-speed, fully automatic looms (capable of up to 1200ppm), which improve fabric quality, tensile strength, and operational efficiency. These new-generation looms require less human intervention and ensure higher productivity. Similarly, automatic conversion lines for gusseting, cutting, and stitching are replacing manual operations to streamline FIBC and small bag production while meeting export-grade consistency requirements.

Replacement Cycles in Existing Plants

With a large base of legacy machines operating for over 20 years, many Indian woven fabric manufacturers are entering a planned capex phase to replace aging machinery. Downtime costs, inconsistent quality, and a lack of digital integration in old machines drive this replacement cycle. OEMs are witnessing strong demand for modular upgrades and retrofit kits, along with full-scale equipment replacement, especially from mid-sized exporters and large domestic players.

Adoption of Energy-Efficient, Lower-Waste Machinery

Rising power costs and volatile raw material prices are driving the adoption of energy-efficient machinery. New models of extruders, looms, and winders come with energy-efficient motors, improved insulation, and smart drives that reduce energy consumption by 15–25%. In parallel, machines with auto tension controls and edge-trim recovery systems are gaining preference to minimize material waste and rework, particularly in high-volume plants.

Impact of Government Technology Upgradation Incentives

Government schemes such as the Technology Upgradation Fund Scheme (TUFS) and MSME modernization programs have significantly accelerated the adoption of advanced domestic machinery. Several states, including Gujarat and Tamil Nadu, are offering capital subsidies and

interest subsidies for machinery upgrades. These incentives are reducing the upfront investment barrier, especially for SME players, and supporting domestic OEMs who now offer CE-compliant and export-grade machines at competitive prices.

Penetration of Automation, IoT, and Industry 4.0 Features in Machinery

Indian machinery suppliers are increasingly embedding smart controls, remote monitoring systems, and predictive analytics into their offerings. Features such as SCADA-based production dashboards, IIoT-enabled maintenance alerts, Remote troubleshooting support, Energy monitoring tools, are enabling plant managers to drive better asset utilization, uptime, and preventive maintenance. This trend is expected to intensify as manufacturers serving export clients seek compliance with global traceability and process transparency standards.

9.5. Overview – Supply Chain for Indian Woven Raffia Machines Market

The value chain of the Indian woven raffia machinery market is evolving rapidly, driven by modernization, localization, and rising end-user expectations. It begins with domestic and partially imported components such as motors, gears, and control systems, which feed into a growing base of Indian OEMs offering high-speed looms, extruders, and automated conversion lines. These OEMs are increasingly integrating automation and IoT features, often with the support of local system integrators. End-users ranging from FIBC and cement bag manufacturers to exporters are seeking complete, energy-efficient solutions with strong after-sales support. As demand for productivity, digitalization, and export compliance rises, after-sales services and predictive maintenance platforms are becoming crucial differentiators. The entire ecosystem is shifting from a price-led to a performance- and service-driven model, supporting India's ambitions to become a global hub for machinery.

9.6. Adoption of New Machinery

India's woven fabric machinery sector is entering a transformative phase, with OEMs introducing next-gen solutions focused on speed, quality, and automation. Below are some key innovations and their relevance to the market:

1. Low Shrinkage Tapeline

Lohia Corp Limited's Duotec Tapeline Series represents the new generation of low-shrinkage tapelines being adopted in India. Capable of achieving high-speed extrusion while maintaining shrinkage levels below 2%, these machines feature precise thermal control and automatic dosing. Such tape lines are critical for improving tape dimensional stability, reducing rework during lamination or conversion, and supporting high-precision applications like carpet backing. Precision and step precision winding machines are used for winding flat or fibrillated PP/HDPE tapes across multiple specifications in terms of tape width and denier.

2. Wide-Width Flexographic Printing Machine

Manufacturers like Lohia Corp Limited, JP Extrusiontech, Star Flex, etc., are offering wide-width flexo printing presses (up to 4000mm) equipped with up to 4 color capabilities. These machines support high-resolution printing on both laminated and unlaminated PP woven fabric at speeds of 150–200 m/min. With features such as servo-driven registration and automatic tension control, they help Indian manufacturers meet global branding requirements essential for exports in pond liner, roof underlayment, lumber wrap etc.

3. High-Speed Circular Looms

New circular looms from Lohia Corp Limited (e.g., Nova Series) and Starlinger & Co. GmbH deliver high operational speeds and come with features such as oil-free cams, auto warp and weft break detection, and user-friendly HMI interfaces. These looms are energy efficient and are ideal for high-volume woven sack production. They address the rising need for consistent fabric quality and reduced labor dependency.

4. Advanced Tape Stretching Lines

Also referred to as 'tape stretching lines', tape extrusion lines are used for producing PP/HDPE tapes. OEMs such as Lohia Corp Limited and JP Extrusiontech are introducing high-throughput tape-stretching lines that can process up to 900 kg/hr using virgin, blended, or recycled polymers. These lines offer integrated annealing and precise temperature and orientation control, making them suitable for converters seeking to scale production while maintaining flexibility in raw material sourcing.

5. Fully Automatic Bag Conversion Lines

Solutions from players like Lohia Corp Limited, RT Woven, and S Mark Engineers are revolutionizing the conversion segment with automated cutting and stitching lines that can produce high-speed conversion machines. These machines often feature gusseting and hemming functions, as well as servo-based unwinding systems that ensure consistent quality. They are particularly suited for small bags, cement bags, and FIBC manufacturers targeting reduced cycle time and higher consistency.

6. Smart Controls & IoT Integration

Automation specialists, such as B&R, are partnering with Indian OEMs to integrate smart controls, SCADA systems, and predictive maintenance features into their machinery. These Industry 4.0-ready machines allow real-time monitoring, remote diagnostics, and improved energy management. Such capabilities are becoming essential for exporters and large converters seeking better uptime, traceability, and data-driven operations.

9.7. Growth Drivers – Indian Woven Raffia Machines Market

India's woven Raffia machinery industry is poised for robust growth, driven by a confluence of policy support, export potential, and rising demand from diversified applications. The demand for Raffia in

India is buoyed by an increase in demand for products whose packaging it is involved with: Below are the key growth drivers shaping the market's momentum:

i. Impact on Favorable Government Policies

The Indian government has been actively supporting capital investment in manufacturing through schemes such as the Technology Upgradation Fund Scheme (TUFS) and various state-level MSME modernization initiatives. These policies have reduced financial barriers for small and mid-sized players to adopt advanced machinery. Moreover, the "Make in India" and "Aatmanirbhar Bharat" missions are promoting the development of indigenous machinery with incentives for R&D, exports, and localization of critical components.

ii. Growth Potential for Export of Woven Sack Machinery from India

Indian machinery manufacturers are increasingly exporting woven sack and FIBC machinery to Africa, the Middle East, Southeast Asia, and Latin America. Their cost-effective, modular machines compete well against Chinese and European alternatives, especially in price-sensitive developing markets. As global demand for bulk packaging increases, Indian OEMs are strengthening their position in international markets by offering after-sales support, CE-compliant designs, and customization options.

iii. Emerging Demand from Specialty Segments (Geo-textiles, Agro-textiles)

The rapid expansion of infrastructure projects, erosion control, road construction, and soil stabilization is creating new demand for geo-textile-grade woven fabric machines. Similarly, agro-textiles, such as shade nets, crop covers, and mulch films, are gaining traction due to increasing mechanization in agriculture and government-supported schemes in protected farming. These niche markets require specialized machines with different loom settings, coating units, and material-handling capabilities, creating an avenue for machinery innovation and upgrades.

iv. Modernization & Replacement Demand in Existing Plants

A significant share of Indian woven sack plants were established over 15 -20 years ago and are now entering replacement cycles. Rising maintenance costs, lack of automation, high electricity consumption, and pressure to meet global compliance standards are prompting manufacturers to replace old looms, tapelines, and conversion lines with high-speed, energy-efficient alternatives. This unlocks substantial capital expenditure inflow into the machinery sector.

v. Expansion of End-Use Sectors

Sustained growth in the cement, fertilizer, food grains, agri-export packaging, and other applications in the technical textile sector is driving demand for higher-capacity and higher-quality woven sacks. Government fertilizer subsidies, PM Awas Yojana (housing), and rural infrastructure push are indirectly driving machine sales by expanding the installed base of woven fabric converters.

9.8. Threats and Challenges for the Indian Woven Raffia Machines Market

Stringent Environmental Regulations: India's growing focus on sustainability and plastic waste reduction is prompting tighter rules on plastic usage, emissions, and recycling. Machine manufacturers now face the challenge of aligning their equipment with eco-compliance norms, including those that support recyclability, effluent management, and energy efficiency.

Rising Competition from Low-Cost Importers: Indian machinery manufacturers have started facing competition from Chinese and other Asian suppliers offering cheaper machines. These foreign players often bundle modern features at competitive prices, pressuring Indian manufacturers to strike a balance between quality, cost, and innovation effectively.

Technology Obsolescence and Modernization Gap: A significant portion of India's existing machinery is outdated, lacking automation, digital controls, or IoT readiness. Upgrading involves high capital expenditure and skilled labor, which many SMEs find difficult to afford or implement without external support or incentives.

Volatility in Raw Material Costs: The woven fabric industry is heavily reliant on petroleum-based polymers, such as polypropylene. Fluctuations in global crude prices directly impact machine utilization and profitability, creating uncertainty for machinery demand cycles.

Shortage of Skilled Workforce for Digital Transition: As machinery becomes more advanced—with the integration of PLCs, sensors, and AI-based control—there's a growing skills gap in the operator workforce. The lack of trained technicians to manage and maintain modern equipment limits the pace of automation adoption across the industry.

9.9. Competitive Overview – India Woven Raffia Machines Market

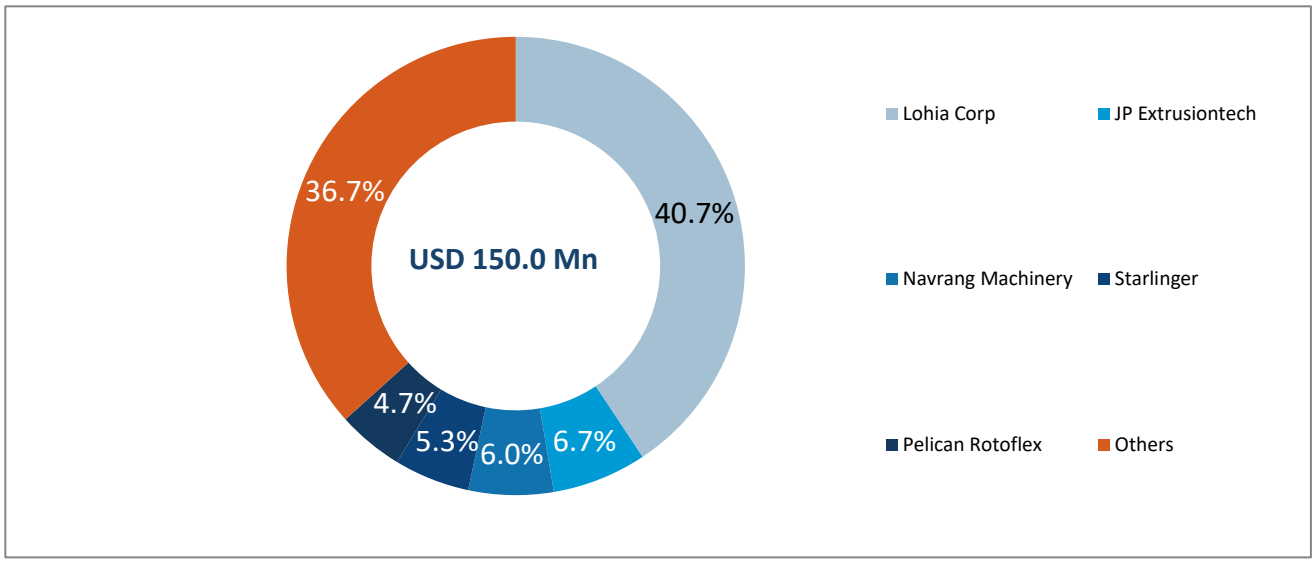
The Indian woven Raffia machinery market is moderately consolidated. There are around 20+ players actively participating in the market. Lohia Corp Limited led the Indian woven raffia machines market in terms of revenue in Fiscal 2025. Other key players include JP Extrusiontech, Navrang Machinery, Starlinger & Co. GmbH, Pelican Rotoflex, and B&B Verpackungstechnik.

9.10. Key players - Market Share Analysis (value)

The India woven Raffia machinery market size is USD 150.0 million in FY2025 for woven raffia machines. Lohia Corp Limited is a market leader in the domestic woven raffia machines market, with a dominant market share of 40.7% by value, in Fiscal 2025. It held a 65.5% market share by value in Fiscal 2023 and 52.8% in Fiscal 2024. JP Extrusiontech holds a notable 6.7% share of value, followed closely by Navrang Machinery with a 6.0% share by value in FY25, suggesting a competitive mid-tier segment.

Starlinger, a known global player, has a relatively modest 5.0% presence, indicating potential localization or pricing challenges in the Indian market. Pelican Rotoflex and B&B Verpackungstechnik, with 5.0% and 3.0% respectively, are positioning themselves as niche or specialized players. Overall, the market exhibits moderate consolidation at the top, with ample room for strategic partnerships among mid-tier and smaller players.

Exhibit 9.3: India Market – Players' Market Share Analysis, FY2025



Source: Frost & Sullivan Analysis


Competitive Benchmarking

10.1. Financial benchmarking of Technical Textile Machinery Manufacturers in India

Brief Overview:

Lohia Corp Limited

Lohia Corp Limited, based in Kanpur, Uttar Pradesh offers services from concept to commissioning, throughout the lifecycle of their machinery and equipment, and are also a solutions provider for the Raffia industry, with a comprehensive suite of products, including equipment for tape extrusion lines, winders, circular loom, coating and lamination lines, printing machine, conversion machine, multifilament yarn machine, recycling machines, twister winder and monofilament extrusion lines, amongst others.

J P Extrusiontech Pvt. Ltd.

J P Extrusiontech, based in Ankleshwar, Gujarat, is a leading manufacturer of plastic processing and packaging machinery. Established in 1987 and formally incorporated in 2011, the company has evolved into a comprehensive provider of end-to-end solutions for the woven sack, film extrusion, and recycling sectors. Their product portfolio includes tape stretching lines, extrusion coating machines, circular looms, flexographic printing presses, bag conversion lines, monofilament lines, and PET/PE washing and strapping systems.

Navrang Machinery Pvt. Ltd.

Navrang Machinery, headquartered in Ahmedabad, Gujarat, specializes in the manufacture and export of advanced machinery for the woven sack, FIBC, and flexible packaging sectors. Founded in the early 2010s, The company offers a wide range of machines including multi-layer co-extrusion lamination lines, cutting and sealing units for HDPE/PP bags, pouch-making systems, gusseting machines, jumbo bag (FIBC) equipment, and online perforation systems. Navrang is known for serving both Indian and overseas markets, and its operations are based out of Vatva GIDC.

Exhibit 10.1: Operating Revenue, EBITDA, and PAT of key companies, India, Value in INR Million, FY24 – FY26

	Operating Revenue (INR million)			EBITDA (INR million)			PAT (INR million)		
Name of the Company	FY24	FY25	FY26	FY24	FY25	FY26	FY24	FY25	FY26
Lohia Corp Limited	11,658.08	13,678.72	17,169.95	1,059.62	2,286.02	3,394.51	297.58	1,178.41	1,934.52
JP Extrusiontech (Pvt.) Ltd.	724.89	500.6	NA	36.91	40.41	NA	6.23	9.85	NA
Navrang Machinery Pvt. Ltd.	531.62	NA	NA	21.11	NA	NA	10.94	NA	NA

NA – Data not available

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

Exhibit 10.2: Total Debt and Total Equity of key companies, India, Value in INR Million, FY24 - FY26

	Total Debt (INR million)			Total Equity (INR million)		
Name of the Company	FY24	FY25	FY26	FY24	FY25	FY26
Lohia Corp Limited	2,803.72	2,121.63	1,527.84	2,496.01	3,715.85	5,257.27
JP Extrusiontech (Pvt.) Ltd.	204.93	203.44	NA	125.56	135.41	NA
Navrang Machinery Pvt. Ltd.	64.46	NA	NA	154.99	NA	NA

NA – Data not available

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis