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A Critical Analysis of the Jute Packaging Materials Act, 1987

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ABSTRACT

The jute industry has historically held a significant position within India's industrial and rural economic framework, contributing both to the employment and the development of ancillary sectors. However, in recent decades, the sector has faced substantial challenges due to technological stagnation, competition from synthetic alternatives, and shifting global market dynamics. In response, the Indian government enacted the Jute Packaging Materials (Compulsory Use in Packing Commodities) Act, 1987 (JPMA), aimed at safeguarding domestic jute production by mandating the use of jute bags for the packaging of key commodities such as food grains and sugar.

This paper critically examines the legal and economic implications of the JPMA, 1987. While the Act was designed to protect jute mill employment, promote rural livelihoods, and support environmental objectives by curbing plastic usage, its implementation has triggered significant controversy. Critics argue that the Act interferes with free market principles and imposes disproportionate costs on industries required to use costlier jute packaging. Moreover, the jute sector has struggled to meet demand efficiently due to outdated machinery and limited technological innovation, thereby undermining the policy's intended economic benefits.

The paper explores the regulatory tensions between environmental sustainability, economic protectionism, and market liberalism. It further analyses how inefficiencies in enforcement, instances of corruption, and the lack of sustainable practices within jute mills have diluted the Act's overall effectiveness. Ultimately, the research suggests that while the JPMA represents a well-intentioned legislative intervention, it requires substantial reform and modernization of the jute industry to align with both environmental and economic goals.

I. INTRODUCTION

The word 'jute' comes the Bengali source 'jhuto' because it means both a fibrous plant and its natural stiffness. The plant derived fibres jute mainly originates from *Corchorus capsularis* and *corchorus olitorius* plants that grows naturally within the warm and humid areas of the

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Indian subcontinent. The Indian domestic usage of jute through rope and mat weaving and sack production spanned many centuries but received its first industrial significance when Britain ruled India. Before the arrival of British, jute was cultivated in Bengal for local Consumption, particularly in household and agrarian use. Artisans used it to make handlooms, cords, fishing nets and sacks. However, there was no large-scale commercial exploitation or industrial processing of the fibre.

During the Colonial period the strategic position of jute become apparent worldwide throughout the nineteenth century. East India Company identified jute's business potential since it could replace flax along with hemp in shipping materials. During the middle 1800's Britain started shipping raw jute materials from Bengal in India to Dundee in Scotland so that Scottish establishment of jute mills throughout India brought about the most significant changes in the sector particularly around Calcutta (present day Kolkata). The initial jute manufacturing facility opened in Rishira in Hoogly district during 1855 while quick jute mill expansion followed shortly after. British capital exercised ownership of jute mills while employing Indian workers through inhumane Labour practices. The British Transformation of jute into a colonial export powerhouse which made Calcutta into the worldwide centre of Jute Commerce. The region between Eastern and Western Bengal developed a distinct economic connection because raw jute came from Eastern Bengal while processing occurred in West Bengal. Under the British Colonial rule jute functional as the "Golden Fibre" which ranked behind cotton in economic importance for functioning gunny bags along with military tents as well as sacks for British Empire International trading activities and their warfare needs. The British imperial economy heavily relied on jute from India to European industries, and the processed products were then reimported to Indian markets at inflated prices. This trade asymmetry, combined with exploitative land revenue systems like the Permanent Settlement and Zamindari, led to economic displacement and monocropping pressures on peasant cultivators.

A. Post Colonial Impact

The jute Industry suffered a severe setback when India split into parts in 1947. East Pakistan obtained all the jute growing territories yet most jute mills remained situated within Indian Borders. The National Jute Industry experienced major logistical and political challenge because of these circumstances. India lost Control of their raw material shortages. The new creation of new political border system caused countries to engage in a harsh trade confrontation. Pakistan implemented export restrictions which prohibited jute shipments to India at the beginning of this policy. The Indian farming sector started cultivating jute in

Assam, Bihar and Odisha territories but the East Bengal jute had maintained its superior quality standard. Over the time jute industry of Pakistan (East Bengal) developed its own authority and autonomy during the 1950's and 1960's. In the 1980's Bangladesh emerged as the top global force in the raw jute materials and in jute production.

B. Post Independence Developments

The newly Independent India started this process by taking control of many jute farmers while trying to save the Industrial sector. The Jute Corporation of India (JCI) initiated operations in 1971 to manage prices levels and provide farmers benefits. The Jute Packaging Materials (Compulsory in Packaging Commodities) Act, 1987 was passed by parliament to maintain steady commodity demand. Despite Government Interventions the Indian jute mill industries declined because of the employee strike along with outdated machinery as well as competition from manmade packaging products like plastic and polypropylene.

Jute preserves its significance for the rural economy mainly in West Bengal while being promoted as an environmentally friendly biodegradable solution because of growing environmental concerns.³

II. WHY IS JUTE PACKAGING IN THE NEWS?

The government has Increased enforcement of a JMPA, 1987 which mandates sugar mills to package 20% of their output in jute bags. The renewed enforcement of the Jute Packaging Materials (Compulsory Use in Packing Commodities) Act, 1987 (JPMA), has reignited national discourse surrounding the role of jute in India's packaging ecosystem. In late 2024, the Government of India issued updated notifications mandating the compulsory use of jute bags for 100% of foodgrain packaging and 20% of sugar packaging, imposing fines for non-compliance, as part of efforts to support and reviving a longstanding policy instrument aimed at safeguarding the traditional jute economy.⁴

Parts of the manufacturing sector especially the sugar industry strongly opposes this order because they challenge it based on economic operations. The sugar production industry went to court through a legal approach that led to ongoing Karnataka High Court procedures. Members of the industry claim jute packaging creates excessive financial responsibility which amounts to \$76 million each year while presenting issues about hygiene in addition to

³ Indian Council of Medical Research, Health Hazards in the Textile Sector: A Study of Jute Workers, ICMR REPORT (2018).

⁴ Aditya Kalra & Aditya Kalra, *India's Government, Sugar Industry Face off over Jute Bags*, REUTERS, Apr. 15, 2025, <https://www.reuters.com/sustainability/land-use-biodiversity/indias-government-sugar-industry-face-off-over-jute-bags-2025-04-15/> (last visited Apr 18, 2025).

durability and large-scale logistics standards. Global clients who purchase products in large volumes together with multinational corporations prefer synthetic packaging because they see it as a superior option regarding food safety and uniform packaging standards. Simultaneously, the jute sector itself is facing significant structural constraints. Persistent raw jute shortages, intermittent labour disputes, and limited mill capacity have undermined the industry's ability to meet the increased demand generated by the statutory packaging requirements. These bottlenecks have drawn attention to the limitations of supply-side readiness, questioning the practical feasibility of full compliance in the absence of systemic reforms.

National together with international media outlets have shown strong coverage on this matter that highlights its diverse aspects. At present the government supports this order since it seeks sustainable packaging solutions combined with preservation of rural workforces throughout eastern regions specifically West Bengal along with Bihar, Odisha, and Assam. The industrial sector opposes the policy by calling it outdated along with inefficient economics which results in support for modernization and flexibility.

In a written response to Unstarred Question No. 3995 in the Rajya Sabha on April 4, 2025, the Ministry of Textiles confirmed that the Government of India continues to mandate the use of jute bags under the Jute Packaging Materials (Compulsory Use in Packing Commodities) Act, 1987 (JPMA), with a sustained emphasis on safeguarding the interests of both raw jute producers and jute mill workers. According to the Ministry, the central government has consistently enforced the compulsory use of 100% jute packaging for foodgrains and 20% for sugar for the past seven years. This policy framework is grounded in the statutory objective of the JPMA, which aims to ensure the viability of jute-based livelihoods and the broader jute economy. Notably, 81% of the total production of jute goods is absorbed through purchases by State Procurement Agencies and the Food Corporation of India for foodgrain packaging. This high share underscores the critical role of government procurement in sustaining demand for jute products. While the response does not detail specific new safeguards related to pricing, it implies that the continuation of these mandates functions as an economic stabilizer for the jute sector, particularly in eastern India where the industry remains a key source of rural employment.⁵

⁵ Ministry of Textiles, *Mandatory use of Jute bags under JMPA* (Answer to Unstarred Question No. 3995), https://sansad.in/getFile/annex/267/AU3995_CpUaTB.pdf?source=pqars (last visited Apr 18, 2025).

III. OBJECTIVES OF JPMA

The Jute Packaging Materials Act 1987 was established to uphold several policy objectives that helped maintain Indian Jute Industry. The Act established a constant jute bag market by enforcing their mandatory use in essential commodity packaging including grains and sugar. Local Jute mills received guarantee orders which stabilises both manufacturing operation and employee jobs. As a part of its environmental initiative. The Jute Packaging toward biodegradable options. The legislation established safeguards to defend the domestic jute business by blacking inexpensive synthetic competitors which protected both the industrial sector and rural employment of jute manufacturing and processing operations. Through its constitutional framework the Act intended both to support the jute manufacturing business sector along with the existence of jobs for thousands of agricultural producers and industrial personnel who worked in jute industries. The Indian jute industry played a vital economic role as an agro-industrial sector which concentrated primarily in the eastern regions of West Bengal Bihar and Assam. In the 1970s and 1980s synthetic plastic alternatives spread rapidly thus causing market share decline in the jute industry that resulted in manufacturing overcapacity and rising layoffs and factory closures. The JPMA emerged to establish compulsory jute product usage because the existing market faced steep deterioration.

The main goal of the JPMA included requiring jute packaging for all essential commodities which mainly consisted of food grains and sugar. The government implemented this statutory requirement because it aimed to establish reliable jute bag markets for producers. The implementation of this measure would improve jute mill production stability because numerous factories experienced declining output or risked closure because jute markets had become insufficient. The protection function of the Act resulted from synthetic material encroachment by polypropylene (PP) and high-density polyethylene (HDPE) sacks which offered cheaper and more convenient alternatives. The JPMA had an essential directive to defend agricultural job opportunities. The jute industry operates as the second biggest employer within the Indian textile sector after cotton. Through jute cultivation farmers receive direct employment from 3.5 lakh workers while their agricultural production supports the employment of about 40 lakh individuals. Economically challenged regions need a strong policy framework because jute industry holds vital social and economic value. Beyond its industrial function the JPMA established itself as a direct rural employment assurance system. The government protected the incomes of people who depended primarily on farming through

their requirement to use jute in packaging.⁶

The JPMA included environmental sustainability among its core reasoning when it was established. Jute functions as an environmentally friendly natural fiber which customers can recycle repeatedly and reuse because it decomposes naturally. The world began to learn about plastic pollution and climate change during that period thus legislative promotion of jute demonstrated foresight. The Act worked in parallel with Indian environmental goals because it cut down on non-biodegradable plastic packaging usage and encouraged sustainably alternative solutions. The legal protection of jute received support because it improves earth fertility and draws little water while trapping carbon which demonstrated its importance to the environment.

The JPMA pursued dual objectives which included maintaining industrial steadiness alongside encouraging enduring investments within the jute sector. Through the creation of a statutory market the government wanted to build a supportive business environment for jute industry development including capital entry and technological advancements and infrastructure upgrades. The guaranteed market demand from the Japanese abated investor and mill owner anxieties which led them to implement modern systems alongside manufacturing process advancements. The ammonia industry needed this protection because it endured outdated technology along with poor productivity for a long period of time. The JPMA functioned as a mechanism to maintain domestic independence in supplying essential commodity packaging materials. The increased demand for national food security objectives made the domestic use of jute bags instead of imported synthetic or alternative packaging crucial for Indian self-reliance in food distribution systems. The mandatory jute packaging requirement of the Act strengthened Indian food security through its management of both grains and sugar packaging within national supply chains protected from international synthetic market fluctuations. The JPMA embodied a special policy which tested new methods of business control. An exception to orthodox free market policies emerged when the Act created specific packaging rules for commodities while the government supported intervention for social and environmental purposes and economic benefits. Under the provisions of the Act the Central Government gained the authority to notify which commodities needed jute packaging through official declarations and determine the specifications. The notified commodities list along with their specific jute content requirements underwent periodical changes according to domestic production capacity and

⁶ Standing Committee on Labour, 17th Lok Sabha, Report on Jute Sector, PRS LEGISLATIVE RESEARCH (2020).

market situation variations.⁷

IV. LEGAL AND ECONOMIC IMPLICATIONS OF JPMA

The JPMA represents legal pressure which conflicts with market liberty principles along with consumer freedom to choose. The Act imposes state control which significantly influences the rights of manufacturers and traders because it requires jute packaging throughout all market conditions and available technological choices. Under Article 19(1)(g) of the Indian Constitution manufacturers possess the right to operate their business. Jeanette Packer Medical Association regulations continue their strict enforcement in a more liberalized economic environment about which questions need to be resolved concerning the balance between regulatory restrictions and fairness. Legal scholars have identified an unreasonable classification issue in the Act because it subjects every market participant to the same requirements including both large and small and national and regional stakeholders regardless of their unique operational needs.⁸

Through Section 3 of the JPMA the central government controls broad power to implement packaging standards through Standing Orders and this process lacks necessary parliamentary or legislative monitoring. This legislative delegation process exposes regulators to freedom to act as they wish without adequate transparency. Subordinate legislation must always comply with both natural justice principles and constitutional protections according to judicial rulings. The Act becomes a destructive tool for business due to its lack of sunset clauses and periodic review systems which enables inconsistent enforcement and potential misuse.

Another Significant legal conflict exists between environmental regulations and the targets set by the JPMA. Time has shown that the Act which initially claimed eco-friendliness prevents Indian industries from adopting more technologically advanced biodegradable packaging materials like paper composites and woven polypropylene bags alongside bio-based polymers. India faces international disputes about sustainable packaging and runs the risk of violating Article 21 rights to environmental safety because of its jute packaging practices. The JPMA conflicts with environmental principles regarding innovation by requiring jute packaging despite alternative biodegradable solutions which might be more sustainable and economical.

The JPMA creates economic burdens on all industries that must adopt jute packaging even though it may be unavailable and unaffordable and impractical to use. Seasonal supply bottle-

⁷ Nandini Guptoo, *Economic Liberalisation, Work and Democracy: Industrial Decline and Urban Politics in Kolkata*, Vol. 42, No. 21 (May 26 - Jun. 1, 2007), pp. 1922-1933 (12 pages), <https://www.jstor.org/stable/4419634>.

⁸ TANMOY DEY, *Jute Industry and Its Labour: Analysis the Trend of Change in Context of West Bengal*, 2018 JETIR May 2018, Volume 5, Issue 5 (2018), <https://www.jetir.org/papers/JETIR1805685.pdf> (last visited May 3, 2025).

necks create severe jute bag shortages which negatively impact the production processes of sugar and food grain manufacturers. Production delays and storage problems together with financial losses occur as a consequence of this situation. Buying and storing jute bags over synthetic materials proves costly since these bags require higher purchasing costs because they also are less lasting. The price increase from such mandatory costs gets transferred to market customers or jute producers who must bear those additional expenses that affect business market competition. Multiple economic problems that arise between sectors stem from the existence of this legislation. The jute market's essential demand regulation via legislation failed to enhance innovation and failed to increase competitiveness for the sector. The protective act led jute mills to remain inefficient and unproductive because they receive government orders instead of pursuing market-based performance improvements. The jute industry suffers from poor modernization and productivity because of protectionist policies which make it vulnerable to worldwide economic changes. Government-directed jute packaging policies create long-term disadvantages for both jute packaging manufacturers and for firms producing synthetic or blended packaging materials. This economic threat emerges because the JPMA functions to oppose multiple variable technology approaches combined with different regional characteristics. States with minimal or zero jute cultivation still need to comply with the mandate despite higher expenses for transportation as well as emissions from transport operations. Small and medium enterprises (SMEs) experience two major challenges in their ability to obtain jute bags: insufficient purchasing capacity and delays in procurement which exposes them to detrimental supply chain risks and legal fines. The JPMA implements a standardized system which fails to respect India's federal economic framework therefore it reduces the ability of local entities to adjust. International trade commitments made by India experience complications because of the JPMA implementation. Trade liberalization and WTO norms apply to all nations because they need to avoid interventions which create artificial market conditions. The JPMA requirement for jute packaging might be seen as a non-tariff trade restriction because it potentially raises costs for agricultural export packaging standards. The policy subjects India to possible international trade dispute proceedings because foreign stakeholders could accuse discrimination or market manipulation.⁹

The JPMA does not implement solutions for fundamental jute industry obstacles including aging machinery, limited jute production, staff tensions, inadequate research advancements and investment and poor technology. The government prefers to achieve its objectives through regulatory forces rather than conduct comprehensive policy reforms for jute manufacturing

⁹ *Union of India & Others v. Indian Jute Mills Association & Others*, (2005) 10 SCC 69 (India).

expansion and brand development across nations. The industry maintains a false belief of safety while statutory rules keep the sector dependent on governmental requirements. The jute sector lacks a market-responsive and environmentally innovative system that matches modern market needs. The JPMA has caused unanticipated consequences which generated illegal market practices and corrupt activities. The implementation of artificial jute bag demands results in stockpiling together with speculative price fluctuations throughout the annual jute procurement period. Suppliers and middle agents modify supply chain operations through price hiking strategies which affects food programs operated by the Food Corporation of India (FCI) and other responsible agencies.¹⁰

The government faces substantial financial strain from acquiring costly jute bags used in public distribution systems thus generating negative economic consequences. Under the JPMA procedures both enforcement mechanisms and dispute resolution processes do not meet legal standards. Although the Act includes penalties it does not provide sufficient details about judicial procedures available for non-compliance complaints. Implementation processes become ambiguous because of this situation which allows bureaucrats to exercise arbitrary power. Consecutive Standing Order exemptions of particular commodities or regions across the country minimize the law's consistency and destroy its credibility. Under the equal protection clause of Article 14 in the Constitution there exists an inconsistency because several industries together with states receive distinct treatment from the legal system without proper explanations and well-defined standards. NITI Aayog, industry associations, and environmental experts now advise governments to reduce the coverage of JPMA in stages so markets can adopt financial incentives that promote environmentally-friendly packaging. The government should provide grants for biodegradable alternatives and performance-based rewards to modernize jute units and tax incentives to businesses conducting sustainable packaging R&D. Strong political and industrial resistance against legislative change impedes efforts to reform the jute sector. The center of jute production in West Bengal continues to experience substantial trade union advocacy and factory owner pressure to preserve the JPMA without changes. Sustainable future development for the jute industry requires more than legal compulsion or obligation because these measures alone will not make it possible¹¹. A balanced policy system needs to defend jute labourers' incomes while promoting modern and

¹⁰ Human Health Risk Assessment Studies in Asbestos, INDIA ENV'T PORTAL, <https://www.indiaenvironmentportal.org.in/files/Human-Health.pdf> (last visited May 3, 2025).

¹¹ Satya Narayan Bag, Uday Chand Kumar & Asim Kumar Pal, Status and Scope of the Jute Industry in India in Comparison to Other World Producers, 24(6) Int'l J. Environ. & Agric. Res. 1 (2016), https://www.researchgate.net/publication/312362034_Status_and_Scope_of_the_Jute_Industry_in_India_in_Comparison_to_other_World_Producers

diversified development in addition to market expansion through voluntary approaches. A reform process of the JPMA requires foundation from federalism principles combined with economic rationality principles alongside sustainability principles. The government should replace mandatory commands with incentive-based programs by guaranteeing procurement of expanding jute-based products such as geo-textiles and jute composites and shopping bags that show rising domestic and international market opportunities.

V. CHALLENGES FACED BY JUTE INDUSTRY

The jute industry operating in India and Bangladesh deals with numerous serious problems impacting its capacity to succeed in the market and keep sustainable production. The raw jute supply stability faces two major challenges including monsoon-related dependencies mixed with climate change effects and traditional farming systems. Jute production suffers from diseases damaging the crops while a shortage of water and insufficient modern farming technology decreases both quality and quantity of jute yield. The jute industry faces economic problems from using outdated facilities and old manufacturing equipment that are mostly found in public sector mills. The operation of numerous jute mills with technological systems installed during the colonial period prevents them from achieving efficient outputs and excessive energy usage while generating flawed products. Labor retention along with operational effectiveness suffers when skilled workforce lacks and when workers receive insufficient earnings and experience unstable job schedules. Price volatility as well as crop seasonality create financial difficulties for farmers and therefore, they choose alternative cash crops like paddy and vegetables over jute cultivation.¹²

The Jute Packaging Materials (Compulsory Use in Packing Commodities) Act of 1987 (JPMA) has unintentionally distorted the market although its purpose was initially beneficial to jute farmers and jute-based packaging. The Jute Packaging Materials Act protects jute farmers and supports jute packaging but has resulted in industry complacency that stopped needed industry innovation and competition from developing. The packaging requirements established by law create opposition between stakeholders because they disagree with the packaging standards imposed on sugar and cement user industries. Multiple factors regarding the irregular enforcement and periodic adjustments of JPMA provisions create additional uncertainty. Foreign competition confronts the industry through cheaper synthetic options combined with low-cost producers headed by China and Vietnam¹³. The failure of jute to gain

¹² Shreya Deb Roy & Y.D. Pitkar, Decline and Revival of Jute Industry, 6 Int'l J. For Multidisciplinary Res. 4 (2024), <https://www.ijfmr.com/research-paper.php?id=26731>.

¹³ Kalpana Kumari, Prashant Kumar Singh, Swati Kumari & Krishna Murari Singh, Dynamics of Jute Export in

global market share stems from inadequate branding along with insufficient marketing approaches which coupled with its inability to align with retail innovations. The combination of inadequate export logistics with customs barriers as well as non-tariff trade limitations creates severe exporting problems for jute manufacturers. Environmental regulations which serve an essential objective have caused increased compliance costs to burden especially small and medium enterprises within this industry sector. Under the current financial situation without proper green transition incentives from the government small and medium enterprises have limited ability to transform and implement environmental practices.

VI. LEGAL REFORM

A sustainable jute industry demands complex legal reforms which unite environmental protection with labour rights while supporting market performance and worldwide business success. A review of the JPMA 1987 needs to be conducted because it should transition from compulsory applications to incentive-based approaches. A select subsidy program for jute packaging should be implemented to motivate its adoption in agricultural and handicraft and sustainable packaging markets. An eco-friendly packaging policy will give graded incentives to materials including jute and its composites which will drive competition and creative solutions. Labor welfare must be the main focus of current legal system restructuring efforts. The Jute Workers' Welfare Code as part of existing labour codes must establish safety standards together with wage standards and social security provisions with grievance resolution procedures. The law should force industrial workplaces to give both protective gear and healthcare benefits in addition to scheduled medical examination programs. Undersection 1 of the National Jute Board as well as the Labour Welfare Organisation must collaborate to execute adherence protocols by conducting inspections and implementing punishments.

A new framework of environmental guidelines needs to be established to guarantee environmentally friendly processing and sustainable retting procedures. Compulsory guidelines for wastewater management and the requirements to use bio-retters and organic softeners and dyes along with financial stock and technical help for small manufacturers need legal authorization and federal subsidies. An "Eco-Industrial Code for Agro-Industries" should be created by amending the Environment (Protection) Act, 1986 specifically to address jute industry needs with provisions that target jute manufacturing. The institution of a legal structure with minimum support prices (MSP) and transparent rules for timely procurement

and contract farming will exercise power to farmers¹⁴. Jute-growing states must establish specific jute-related provisions in Agricultural Produce Market Committee (APMC) Acts to guarantee cultivators' market entry and reasonable pricing and complaint resolution access. The protection systems for jute-based handicrafts together with textiles under intellectual property rights (IPR) and geographical indication (GI) need expansion as part of the fifth development strategy. Self-help and cooperative organizations should get legal assistance when filing for patents and design registrations and GI tags along with trademarks. The implementation of these measures will guarantee traditional knowledge protection and will boost marketing visibility. Trade and investment regulations should receive harmonization as a measure to boost export opportunities. The Foreign Trade Policy (FTP) should embrace jute by giving priority to export schemes that include interest aid and logistics assistance as well as easy compliance requirements. By establishing a Jute Export Promotion Council through legislation the organization would help provide market access opportunities and certification services and conduct negotiations with foreign countries. Research and innovation must have support from the legal framework as its final priority. The “National Jute Innovation and Research Act” would establish permanent funding for jute bio-composite and biodegradable jute-plastic research along with agro-technology applications. The development of future jute products should be fuelled through tax benefit programs and grant support and public-private collaboration agreements for universities technical institutions and startup entities.¹⁵

VII. JUTE ALTERNATIVE AND WAY FORWARD

Jute faces growing competition from alternative fiber materials because of its limited performance in durability as well as its resistance to moisture and versatility requirements. The increasing preference for natural materials has led to the expansion of hemp together with flax as well as kenaf and ramie and coir alongside banana fibre. The fast growth rate of hemp results in reduced water usage while producing fibrous substances that remain stronger and provide more versatility than jute fibers. The textile applications along with construction applications and bioplastics production provide jute with an advantageous market position. The agricultural textile and packaging sector utilizes banana fibre and coir as biodegradable affordable materials that rise in popularity. Eco-friendly packaging materials are produced using the biodegradable polymers polylactic acid (PLA) which derives from corn starch and

¹⁴ Arjan De Haan, *Unsettled Settlers: Migrant Workers and Industrial Capitalism in Calcutta*, 31 *Mod. Asian Stud.* 919 (1997), <https://www.jstor.org/stable/312849>.

¹⁵ Chitra Joshi, *Contemporary Perspectives on Labor History in India*, *Oxford Res. Encyclopedia Asian Hist.* (May 23, 2019), <https://oxfordre.com/asianhistory/view/10.1093/acrefore/9780190277727.001.0001/acrefore-9780190277727-e-37> (last visited May 5, 2025).

sugarcane. Such materials merge the advantages of synthetic polymers with degradability thus providing an alternative between functional performance and sustainability benefits.¹⁶ The continuous research and technological growth of these bio composites enables their commercial viability and superior performance than traditional jute materials in particular uses. The jute industry must sustain itself through commercial diversification. The jute industry needs new momentum from the development of jute-based composites along with reinforced bio-plastics and value-added products like geotextiles jute felt and technical textiles. Support for the industrial transformation needs public-private collaboration with government-backed research initiatives operating through innovation centres. Minimal waste together with recyclability and reusability of jute products along with circular economy alignment works toward establishing sustainable prospects for the industry's future.¹⁷

¹⁶ Amiya Kumar Bagchi & Panchanan Das, Indian Jute Manufactures: Adaptation and Survival in a 'Sunset' Industry, 8 Int'l J. Mgmt. Concepts & Phil. 181 (2014), <https://doi.org/10.1504/IJMCP.2014.063852>.

¹⁷ Amreen Jahan, The Environmental and Economic Prospects of Jute with a Connection to Social Factors for Achieving Sustainable Development (Master's thesis, Uppsala Univ. 2019), <https://www.diva-portal.org/smash/get/diva2:1328785/FULLTEXT01.pdf>.