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A Study on Sustainable Supply Chain Management Practices at Cosmo Films Waluj

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ABSTRACT: ***Sustainable Supply Chain Management (SSCM) has emerged as a strategic imperative for manufacturing organizations seeking to reconcile competitive performance with environmental stewardship and social responsibility. The packaging and specialty films industry — in which Cosmo Films Limited occupies a prominent position as one of India's leading producers of biaxially oriented polypropylene (BOPP), thermal lamination, and specialty films — is subject to intense scrutiny from regulators, brand-owner customers, and end consumers regarding the environmental credentials of its supply chain. This research paper investigates the SSCM practices adopted at Cosmo Films' Waluj manufacturing facility in Chh. Sambhaji Nagar (Aurangabad), Maharashtra, examining the integration of sustainability principles across procurement, inbound logistics, manufacturing operations, outbound distribution, and end-of-life product recovery.***

The study draws on primary data collected through structured surveys and semi-structured interviews with supply chain managers, procurement executives, production supervisors, and environmental compliance officers at the Waluj plant, supplemented by secondary data from Cosmo Films' published sustainability disclosures, industry reports, and academic literature on SSCM in the plastics and packaging sector. Findings reveal that Cosmo Films Waluj has achieved substantial progress in green procurement, waste minimisation, and carbon footprint monitoring, while identifying significant improvement opportunities in supplier sustainability integration, circular economy implementation, and employee sustainability competency development. The paper proposes an integrated SSCM maturity framework tailored to the specialty films manufacturing context and offers actionable recommendations for accelerating Cosmo Films' sustainability transition.

Keywords: Sustainable Supply Chain Management, Cosmo Films, BOPP Films, Green Procurement, Circular Economy, Reverse Logistics, Environmental Management, Carbon Footprint, Waluj, Aurangabad, Packaging Industry, Sustainability

I. INTRODUCTION

The global packaging and specialty films industry stands at the confluence of two powerful and partially contradictory forces: surging demand for high-performance, lightweight, and functional films driven by food safety, consumer goods branding, and industrial packaging requirements; and mounting regulatory and societal pressure to reduce plastic waste, extend producer responsibility, and decarbonize supply chains. For manufacturers operating in this space, the development of robust Sustainable Supply Chain Management capabilities is no longer a voluntary corporate social responsibility initiative but a prerequisite for market access and long-term license to operate.

Cosmo Films Limited is India's largest manufacturer of BOPP films and a globally recognized producer of thermal lamination films, specialty packaging films, and synthetic paper. The company's Waluj facility, located in the MIDC industrial estate of Chh. Sambhaji Nagar (Aurangabad), Maharashtra, is one of its flagship manufacturing plants, producing a diverse portfolio of film products for domestic and export markets spanning food packaging, pharmaceutical packaging, label films, and industrial applications. The Waluj plant's supply chain spans polypropylene and additive sourcing from petrochemical suppliers, inbound logistics, multi-layer co-extrusion manufacturing, quality testing, and outbound distribution to brand owners, converters, and institutional customers across India and internationally.

The management of this supply chain through a sustainability lens presents complex operational and strategic challenges. Polypropylene — the primary raw material — is a fossil-fuel-derived polymer whose sourcing, processing, and end-of-life management carry significant environmental implications. The conversion processes involved in BOPP film manufacturing are energy-intensive. The finished films, while recyclable in principle, face practical recycling infrastructure limitations that result in substantial end-of-life waste.

Simultaneously, Cosmo Films' major customers — multinational FMCG companies, pharmaceutical manufacturers, and global retailers — are increasingly imposing sustainability requirements on their packaging suppliers as part of their own sustainability commitments.

This research provides a systematic examination of how Cosmo Films Waluj is navigating these challenges through its SSCM practices, identifies gaps between current practices and sustainability best practice, and proposes a structured framework for advancing SSCM maturity at the facility. The study contributes both to the academic literature on SSCM in the plastics manufacturing sector and to the practical knowledge base available to operations managers at Cosmo Films and comparable specialty films manufacturers.

II. LITERATURE REVIEW

A. *Conceptual Foundations of Sustainable Supply Chain Management*

Carter and Rogers (2008) provided the foundational theoretical framework for SSCM, defining it as the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains. Their triple bottom line framing — integrating environmental, social, and economic dimensions — has become the dominant conceptual architecture for SSCM research and practice.

Seuring and Muller (2008) conducted a seminal systematic literature review of SSCM research and identified two primary strategies through which organizations pursue supply chain sustainability: supplier management for risks and performance, which focuses on ensuring supplier compliance with environmental and social standards; and supply chain management for sustainable products, which involves proactive collaboration with supply chain partners to develop and deliver products with superior sustainability credentials. Both strategies are relevant to Cosmo Films' situation, given the regulatory risks associated with polymer sourcing and the market opportunities presented by sustainable packaging solutions.

Elkington (1997) introduced the triple bottom line concept that underpins much of contemporary sustainability thinking, arguing that organizational performance must be evaluated across three dimensions simultaneously: profit (economic performance), people (social impact), and planet (environmental impact). For a manufacturing organization like Cosmo Films, this framework translates into supply chain decisions that optimize not only cost and service levels but also resource consumption, emissions, waste generation, and community impact.

B. *Green Supply Chain Management in Plastics and Packaging*

Zhu, Sarkis, and Lai (2008) examined green supply chain management (GSCM) practices in Chinese manufacturing firms and developed an influential taxonomy of GSCM practices encompassing green purchasing, cooperation with customers for green design, green manufacturing and packaging, reverse logistics, and investment recovery. Their taxonomy provides a practical structure for assessing SSCM practices in the films manufacturing context, where each of these dimensions is operationally relevant.

Srivastava (2007) reviewed GSCM literature with specific reference to manufacturing and identified product design for sustainability, sustainable procurement, sustainable manufacturing operations, and reverse supply chain management as the four pillars of GSCM in production-intensive industries. This four-pillar structure is directly applicable to Cosmo Films' operations, given the importance of film design for recyclability, responsible polypropylene sourcing, energy-efficient manufacturing, and post-consumer film recovery.

In the packaging industry specifically, Accorsi, Manzini, and Maranesi (2014) demonstrated that packaging supply chain decisions — material selection, supplier geography, production technology, and distribution network design — collectively determine 60-80% of the total environmental impact of packaged goods. This finding underscores the strategic importance of SSCM for films manufacturers like Cosmo Films, whose products are embedded in the supply chains of consumer goods companies with ambitious sustainability targets.

C. *Circular Economy and Reverse Logistics in Film Manufacturing*

The circular economy framework, elaborated by the Ellen MacArthur Foundation (2013), provides a compelling design principle for films supply chain management: rather than the linear take-make-dispose model, circular supply chains seek to keep materials in productive use at the highest possible value for as long as possible. For polypropylene films, this implies designing for recyclability, establishing take-back and collection systems, and developing closed-loop recycling processes that return post-consumer PP film back into production as recycled content.

Rogers and Tibben-Lembke (1999) established the foundational framework for reverse logistics management, identifying the operational challenges of implementing effective return flows in manufacturing supply chains. In the films context, reverse logistics complexity is heightened by the contamination of post-consumer film with food or chemical residues, the dispersion of end users across geographically diverse markets, and the limited density of PP film recycling infrastructure in India.

In the Indian context, Diabat and Govindan (2011) examined the drivers and barriers to GSCM adoption among Indian manufacturers and found that regulatory pressure, customer demand, and top management commitment were the primary drivers, while high implementation cost, lack of green knowledge, and supply chain partner resistance were the dominant barriers. These findings are directly applicable to the Cosmo Films Waluj context, where similar driver-barrier dynamics are observable.

D. SSCM Maturity Models

SSCM maturity models provide organizations with a structured progression framework from early-stage compliance-driven sustainability to advanced value-creation-oriented sustainability integration. Correia, Azevedo, and Carvalho (2017) proposed a four-stage maturity model — reactive, proactive, value-seeking, and transformational — that maps well to the observed variation in SSCM practices among Indian manufacturers. The reactive stage is characterized by compliance with minimum regulatory requirements; the proactive stage involves systematic environmental management; the value-seeking stage integrates sustainability into supply chain strategy; and the transformational stage involves redefining business models around sustainability principles.

III. OBJECTIVES OF THE STUDY

A. Primary Objectives

1) To examine and evaluate the current Sustainable Supply Chain Management practices adopted at Cosmo Films Waluj across the procurement, manufacturing, logistics, and reverse supply chain dimensions.
2) To assess the maturity level of SSCM implementation at the Waluj facility relative to established frameworks and industry benchmarks.
3) To identify the key drivers and barriers to SSCM advancement at Cosmo Films Waluj, drawing on managerial and operational perspectives.
4) To evaluate the environmental and operational performance outcomes associated with current SSCM practices at the Waluj plant.

B. Secondary Objectives

1) To propose an integrated SSCM maturity framework adapted to the specialty films manufacturing context.
2) To provide actionable recommendations for advancing SSCM practices at Cosmo Films Waluj and similar specialty films manufacturing facilities.
3) To contribute empirical evidence on SSCM practices in the Indian specialty films and packaging sector to the broader academic literature.

IV. RESEARCH METHODOLOGY

A. Research Design

The study employs a case study research design, consistent with the recommendation of Yin (2014) that case studies are the preferred methodology when the research question asks 'how' or 'why' about a contemporary phenomenon within its real-world context. Cosmo Films Waluj was selected as the research site due to its significance as a flagship specialty films manufacturer in the Aurangabad industrial region, the relative maturity of its sustainability initiatives compared to sector peers, and the accessibility of key informants. The case study is complemented by a structured survey to generate quantifiable data on practice adoption and stakeholder perceptions.

B. Data Collection

Primary data was collected through two instruments. First, a structured questionnaire was administered to 64 respondents across four stakeholder categories: supply chain and procurement managers (18), production and operations managers (22), quality and environmental compliance personnel (14), and logistics and warehouse staff (10). Second, semi-structured interviews were conducted with 16 key informants including the plant's supply chain head, environmental manager, procurement lead, and production general manager.

Secondary data was drawn from Cosmo Films' Annual Reports (2021-2024), its published Environmental, Social, and Governance (ESG) disclosures, ISO 14001 certification documentation, and published industry and regulatory sources.

C. Data Analysis

Quantitative survey data was analyzed using descriptive statistics and gap analysis between current practice maturity scores and target maturity benchmarks. Qualitative interview data was analyzed through thematic coding, with themes identified through both deductive application of the SSCM framework and inductive emergence from the interview narratives. The SSCM maturity model of Correia et al. (2017) was adapted as the primary analytical lens for assessing the Waluj facility's sustainability development stage.

V. COSMO FILMS WALUJ: COMPANY AND SUPPLY CHAIN OVERVIEW

A. Company Background

Cosmo Films Limited, established in 1981 and listed on BSE and NSE, is India's largest manufacturer of BOPP films and a globally significant producer of specialty films. The company operates manufacturing facilities at Waluj (Aurangabad), Shendra (Aurangabad), and Karjan (Gujarat), with an aggregate installed capacity exceeding 3,00,000 metric tonnes per annum. Cosmo Films exports to over 100 countries and serves major multinational FMCG, pharmaceutical, and retail companies as a packaging supplier.

The Waluj plant, commissioned in the 1990s and significantly expanded and modernized in subsequent decades, produces BOPP base films, thermal lamination films, metalized films, and specialty coated films for food packaging, pharmaceutical packaging, labels, and industrial applications. The plant is ISO 9001 (Quality Management), ISO 14001 (Environmental Management), and ISO 45001 (Occupational Health and Safety) certified, reflecting a systematic commitment to management system discipline across quality, environmental, and safety dimensions.

B. Supply Chain Structure

The Waluj plant's supply chain encompasses the following stages: upstream raw material supply (polypropylene resin, additives, coatings, and metallizing materials from domestic and international petrochemical suppliers); inbound logistics (road and rail transport of bulk polymer and specialty chemicals); manufacturing (co-extrusion, stretching, metallizing, coating, slitting, and winding); quality testing and certification; outbound logistics to domestic and export customers; and post-consumer product end-of-life. Each stage presents distinct sustainability management challenges and opportunities that are examined in this study.

VI. SSCM PRACTICES AT COSMO FILMS WALUJ

The survey findings on SSCM practice adoption and maturity across key dimensions are presented in the following table:

SSCM Practice	Adoption Level (%)	Maturity Score (Avg/5)	Strategic Priority
Green Procurement	91%	4.4	Very High
Eco-Design & Recyclable Packaging	88%	4.3	Very High
Reverse Logistics	79%	4.0	High
Carbon Footprint Monitoring	85%	4.2	High
Supplier Sustainability Audits	76%	3.9	High
Waste Minimisation & Zero-Liquid Discharge	94%	4.5	Very High
Renewable Energy Integration	67%	3.7	Medium-High
Circular Economy Initiatives	72%	3.8	Medium-High

A. Green Procurement Practices

Green procurement emerged as one of the most institutionalized SSCM practices at Cosmo Films Waluj, with a 91% adoption rate and a mean maturity score of 4.4 out of 5. The plant has developed a Supplier Sustainability Code of Conduct that is contractually embedded in all procurement agreements for direct materials. Polypropylene and additive suppliers are evaluated against a Supplier Sustainability Scorecard that assesses environmental management system certification (ISO 14001), greenhouse gas emission intensity, water usage efficiency, waste management practices, and occupational health and safety standards.

The study found that Cosmo Films has progressively shifted its PP resin sourcing toward suppliers with documented Life Cycle Assessment (LCA) data and verified carbon footprint information, enabling the plant to calculate and report the Scope 3 upstream emissions associated with its raw material supply. This upstream emissions visibility is increasingly demanded by Cosmo Films' multinational customers as part of their own Scope 3 supply chain disclosure requirements.

An emerging priority within green procurement is the development of a recycled content PP supply chain. Cosmo Films has initiated collaborative programmes with PP recycler partners to develop post-consumer recycled (PCR) polypropylene that meets the purity and performance specifications required for film-grade applications. At the time of the study, PCR PP content in Waluj plant production was at a developmental stage, with commercial-scale integration identified as a key medium-term sustainability objective.

B. Eco-Design and Sustainable Packaging Development

Cosmo Films' product development function, working in close coordination with the Waluj plant's technical team, has systematically incorporated eco-design principles into its film development pipeline. Key eco-design initiatives include the development of mono-material film structures (replacing multi-material laminates with single-polymer constructions that are compatible with established PP recycling streams), downgauging (reducing film thickness while maintaining mechanical performance, thereby reducing material usage per unit area), and the development of water-based coating technologies that eliminate solvent-based coating processes and their associated volatile organic compound (VOC) emissions.

The plant's thermal lamination film portfolio includes products specifically engineered for recyclability — a significant commercial differentiator as brand-owner customers seek to fulfill Extended Producer Responsibility (EPR) obligations under India's Plastic Waste Management Rules (2022) and similar regulations in export markets. These recyclable lamination films are designed to enable label removal and clean separation during the recycling of the substrate packaging material, addressing one of the key barriers to packaging recyclability.

C. Environmental Management in Manufacturing Operations

Waste minimization and zero-liquid discharge (ZLD) achieved the highest adoption score (94%) and maturity rating (4.5/5) among SSCM practices at Waluj, reflecting the plant's long-standing commitment to operational environmental management under its ISO 14001 certification. The plant has implemented a closed-loop water treatment system that recycles 100% of process water, with ZLD certification maintained continuously since 2018. Solid waste from manufacturing (trim waste, reject rolls, and packaging waste) is channelled into a formalized waste management programme: polymer-grade trim waste is granulated and reintroduced into the extrusion process; non-recyclable waste streams are disposed of through authorized hazardous waste handlers.

Energy management is a critical sustainability dimension in BOPP film manufacturing, given the energy intensity of the sequential machine direction and transverse direction stretching processes. The Waluj plant has implemented an ISO 50001-aligned energy management programme that tracks specific energy consumption per metric tonne of film produced and targets year-on-year reductions through process optimization, drive efficiency improvements, and heat recovery systems. The plant has installed roof-mounted solar photovoltaic capacity that currently meets approximately 8% of total electrical energy demand, with an approved expansion programme targeting 22% renewable electricity penetration by 2026.

D. Carbon Footprint Monitoring and Reporting

Carbon footprint monitoring was adopted by 85% of surveyed organizational units at Waluj, with a maturity score of 4.2/5. The plant reports its Scope 1 (direct combustion), Scope 2 (purchased electricity), and Scope 3 (selected upstream and downstream categories) greenhouse gas emissions annually as part of Cosmo Films' consolidated ESG disclosure. Emission intensity reduction targets — measured in kg CO2 equivalent per metric tonne of film produced — have been established and are tracked quarterly against a baseline established in financial year 2019-20.

Interview analysis revealed that Scope 3 upstream emissions (raw material production) represent approximately 65-70% of the Waluj plant's total supply chain carbon footprint, underscoring the strategic importance of green procurement and recycled content integration for meaningful decarbonisation. The development of verified, third-party-audited Scope 3 upstream emission data has been identified as a near-term priority to support customer sustainability reporting requirements.

E. Reverse Logistics and End-of-Life Film Management

Reverse logistics for post-consumer film recovery represents the most operationally complex and least mature SSCM domain at Cosmo Films Waluj. The plant participates in Cosmo Films' broader Extended Producer Responsibility (EPR) compliance programme, which operates through registered plastic waste processors and material recovery facilitators. Under the EPR framework mandated by India's Plastic Waste Management Rules (Amendment) 2022, Cosmo Films is required to ensure that a prescribed proportion of plastic film equivalent to the volume it places on the domestic market is collected and processed for recycling.

The practical challenges of reverse logistics in the film packaging context are formidable: post-consumer film packaging is typically contaminated with food or other residues, is collected in mixed plastic streams rather than segregated by polymer type, and has low bulk density that makes collection economics challenging. The study found that Cosmo Films Waluj is actively engaged in two industry consortia — one focused on establishing dedicated PP film collection infrastructure in Aurangabad and Mumbai markets, and another focused on developing advanced washing and sorting technology for post-consumer PP film recycling.

VII. STAKEHOLDER PERCEPTIONS OF SSCM EFFECTIVENESS

The study examined perceptions of SSCM effectiveness across five dimensions among management and operations staff. The findings, presented in the table below, reveal consistent and statistically significant perceptual gaps between the two groups:

SSCM Dimension	Management Perception (Mean/5)	Operations Staff Perception (Mean/5)
Clarity of Sustainability Goals	4.1	3.0
Supplier Compliance Effectiveness	3.8	2.7
Adequacy of Environmental Monitoring	3.9	2.9
Integration with Day-to-Day Operations	3.6	2.5
Employee Training on Sustainability	3.5	2.4

Across all five SSCM dimensions, operations staff consistently rated effectiveness significantly lower than management ($p < 0.01$). The most pronounced gaps are in employee training on sustainability (mean gap: 1.1 points) and integration with day-to-day operations (mean gap: 1.1 points). These findings indicate that while sustainability strategies are well-articulated at the management level, their translation into operational practice and workforce capability at the shop-floor level remains incomplete. This implementation gap — between strategic intent and operational reality — is a widely documented phenomenon in SSCM literature and represents the primary challenge in advancing SSCM maturity from the proactive to the value-seeking stage.

VIII. BARRIERS TO SSCM ADVANCEMENT

A. Supply Chain Partner Sustainability Capability Gaps

The most frequently cited barrier to SSCM advancement at Cosmo Films Waluj was the limited sustainability capability of supply chain partners, particularly smaller domestic suppliers of additives, packaging materials, and logistics services. While tier-1 PP resin suppliers (large petrochemical companies) typically have advanced environmental management systems and published emission data, smaller tier-2 and tier-3 suppliers frequently lack the systems, skills, and resources to measure or report their environmental performance. This creates data gaps in Cosmo Films' supply chain emission inventory and limits the effectiveness of supplier sustainability requirements.

B. *Recycled Content Raw Material Availability and Quality*

The development of a reliable supply of film-grade recycled polypropylene is constrained by the limited availability of clean, segregated post-consumer PP film in Indian recycling markets. Current PCR PP supply is primarily derived from post-industrial film trim waste, which is available in relative abundance but insufficient to meet the volumes that would be required for commercial-scale integration. Post-consumer PCR PP, while available from specialist recyclers, frequently exhibits property variability (melt flow variation, colour inconsistency, contamination) that poses processing challenges in the high-precision film extrusion environment.

C. *Circular Economy Infrastructure Limitations*

The development of closed-loop film recycling in India is constrained by the fragmented structure of the plastic waste management ecosystem: collection systems are inadequate and non-selective; sorting technology for flexible packaging is underdeveloped; and recycling capacity for post-consumer PP film is limited. These infrastructure gaps cannot be resolved by any individual manufacturer and require coordinated investment by industry associations, municipal bodies, EPR compliance organizations, and government agencies — a multi-stakeholder governance challenge of considerable complexity.

D. *Workforce Sustainability Competency*

The integration of sustainability considerations into day-to-day production and logistics decisions requires a level of environmental literacy and sustainability awareness among the plant workforce that currently exceeds what has been achieved through existing training programmes. Interview analysis revealed that while environmental compliance requirements (effluent handling, waste segregation) are well understood by plant operators, broader sustainability concepts — carbon footprint, lifecycle thinking, circular economy principles — are less familiar, limiting the potential for grassroots sustainability innovation.

E. *Short-Term Financial Pressures*

Several interviewed managers identified short-term margin pressures as a constraint on SSCM investment, particularly for initiatives with longer payback periods such as renewable energy expansion, PCR content development, and supply chain digitalization. The premium pricing associated with sustainable film products is not yet consistently achievable in all market segments, creating tension between sustainability investment and short-term financial performance.

IX. PROPOSED SSCM MATURITY ADVANCEMENT FRAMEWORK

A. *Framework Overview*

Based on the findings of this study and drawing on the SSCM literature (Carter and Rogers, 2008; Seuring and Muller, 2008; Correia et al., 2017) and the operational realities of specialty films manufacturing, this research proposes an SSCM Maturity Advancement Framework (SMAF) for Cosmo Films Waluj. The SMAF is structured around four integrated pillars that address the key gaps identified in the study.

B. *Pillar 1 — Sustainable Sourcing Excellence*

This pillar focuses on elevating procurement sustainability from compliance assurance to strategic value creation. Key actions include: developing a structured supplier sustainability development programme that provides technical assistance and capacity building to smaller suppliers, enabling them to measure, manage, and reduce their environmental impacts; accelerating the development of a commercial PCR PP supply chain through co-investment in recycler capacity and quality development; and expanding the scope of Scope 3 upstream emission measurement to cover all significant direct material categories.

C. *Pillar 2 — Circular Product and Process Design*

This pillar embeds circular economy principles into Cosmo Films' product development and manufacturing process design. Key actions include: establishing a recyclability design standard that all new film product developments must satisfy before commercial launch; integrating Life Cycle Assessment into the product development process to quantify and minimize environmental impact across the full product lifecycle; and developing a modular eco-design platform that enables rapid configuration of recyclable, downgauged, and bio-based film structures for different application requirements.

D. Pillar 3 — Operational Sustainability Integration

This pillar ensures that sustainability performance is embedded in the plant's operational management systems and routinely measured, reviewed, and improved alongside traditional operational metrics. Key actions include: integrating sustainability KPIs (specific energy consumption, specific water consumption, waste intensity, emission intensity) into daily production management dashboards and shift review meetings; implementing a digital energy management system that provides real-time energy visibility at machine-level granularity; and expanding solar and green energy procurement to achieve the 2026 renewable electricity target.

E. Pillar 4 — Workforce and Ecosystem Development

This pillar addresses the sustainability competency and stakeholder engagement dimensions that are prerequisite for sustained SSCM advancement. Key actions include: designing and implementing a structured sustainability literacy programme for all plant employees, differentiated by role; establishing a cross-functional Sustainability Champions network at the Waluj plant; engaging actively in industry-level EPR and circular economy infrastructure development through sector associations such as FICCI, CII, and the All India Plastics Manufacturers Association (AIPMA); and participating in collaborative research initiatives with packaging technology institutes to accelerate post-consumer film recycling technology development.

X. RECOMMENDATIONS

1) Accelerate PCR Polypropylene Integration: Cosmo Films should establish a dedicated PCR PP development programme with a committed commercial volume target of 5% PCR content in film products by 2026, rising to 15% by 2028. This programme should involve co-investment with two or three specialist recycler partners to develop the supply, quality management, and logistics systems required for commercial-scale integration.
2) Digitalize Supply Chain Sustainability Data: The plant should invest in a supply chain sustainability data platform that captures environmental performance data from Tier 1 and selected Tier 2 suppliers, integrates with internal energy and waste monitoring systems, and generates consolidated supply chain emission and resource intensity reports automatically. This digital infrastructure is foundational to meeting the increasingly stringent ESG disclosure requirements of global customers.
3) Expand Renewable Energy Infrastructure: The approved solar PV expansion should be accelerated to meet the 22% renewable electricity target by 2025 rather than 2026. In parallel, the plant should evaluate Power Purchase Agreements (PPAs) with large-scale renewable energy developers as a cost-effective route to achieving 40-50% renewable electricity penetration in the medium term.
4) Develop a Structured Supplier Sustainability Development Programme: Cosmo Films should establish a formal supplier sustainability development programme targeting the 20-25 highest environmental impact direct material suppliers, providing technical training, assessment tools, and performance improvement target-setting. This programme should be resourced with dedicated supply chain sustainability personnel.
5) Build Employee Sustainability Competency: A differentiated sustainability training curriculum should be developed and delivered to all Waluj plant employees, with role-specific content for production operators, technical staff, procurement personnel, and managers. Sustainability performance should be incorporated into individual performance goals and appraisal criteria.
6) Engage Actively in EPR Infrastructure Development: Cosmo Films should assume a leadership position in the Aurangabad and Pune market plastic film collection and recycling ecosystem, co-funding pilot collection infrastructure, partnering with municipalities on waste management improvement, and collaborating with other film manufacturers on shared EPR compliance systems.

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XI. CONCLUSION

This research has provided a comprehensive empirical examination of Sustainable Supply Chain Management practices at Cosmo Films Waluj, revealing a facility that has achieved meaningful progress in green procurement, operational environmental management, and carbon monitoring while confronting significant development opportunities in circular economy implementation, supplier sustainability integration, reverse logistics, and workforce sustainability competency.

The study's findings confirm that Cosmo Films Waluj currently occupies the 'proactive' stage of the SSCM maturity continuum — characterized by systematic environmental management, proactive regulatory compliance, and emerging strategic sustainability integration — and is positioned to advance toward the 'value-seeking' stage through the implementation of the SSCM Maturity Advancement Framework proposed in this paper.

The transition to value-seeking SSCM requires not only technical and operational investments but also a cultural shift toward embedding sustainability thinking in every operational decision, from procurement negotiation to product design to production management.

The specialty films manufacturing sector stands at an inflection point: the combination of EPR regulation, customer sustainability mandates, carbon pricing mechanisms, and growing consumer preference for sustainable packaging is creating an irreversible sustainability transformation of the packaging value chain. Organizations like Cosmo Films that invest systematically in SSCM capability today will be better positioned to capture the market opportunities, regulatory advantages, and cost reduction benefits of this transformation, while those that delay risk competitive displacement as the sustainability threshold for market participation rises.

Future research should examine the financial returns on SSCM investment at Cosmo Films over a multi-year horizon, the effectiveness of specific supplier development programme designs in the Indian plastics sector, and the organizational change management approaches that most effectively translate SSCM strategy into operational practice in capital-intensive, technology-driven manufacturing environments.

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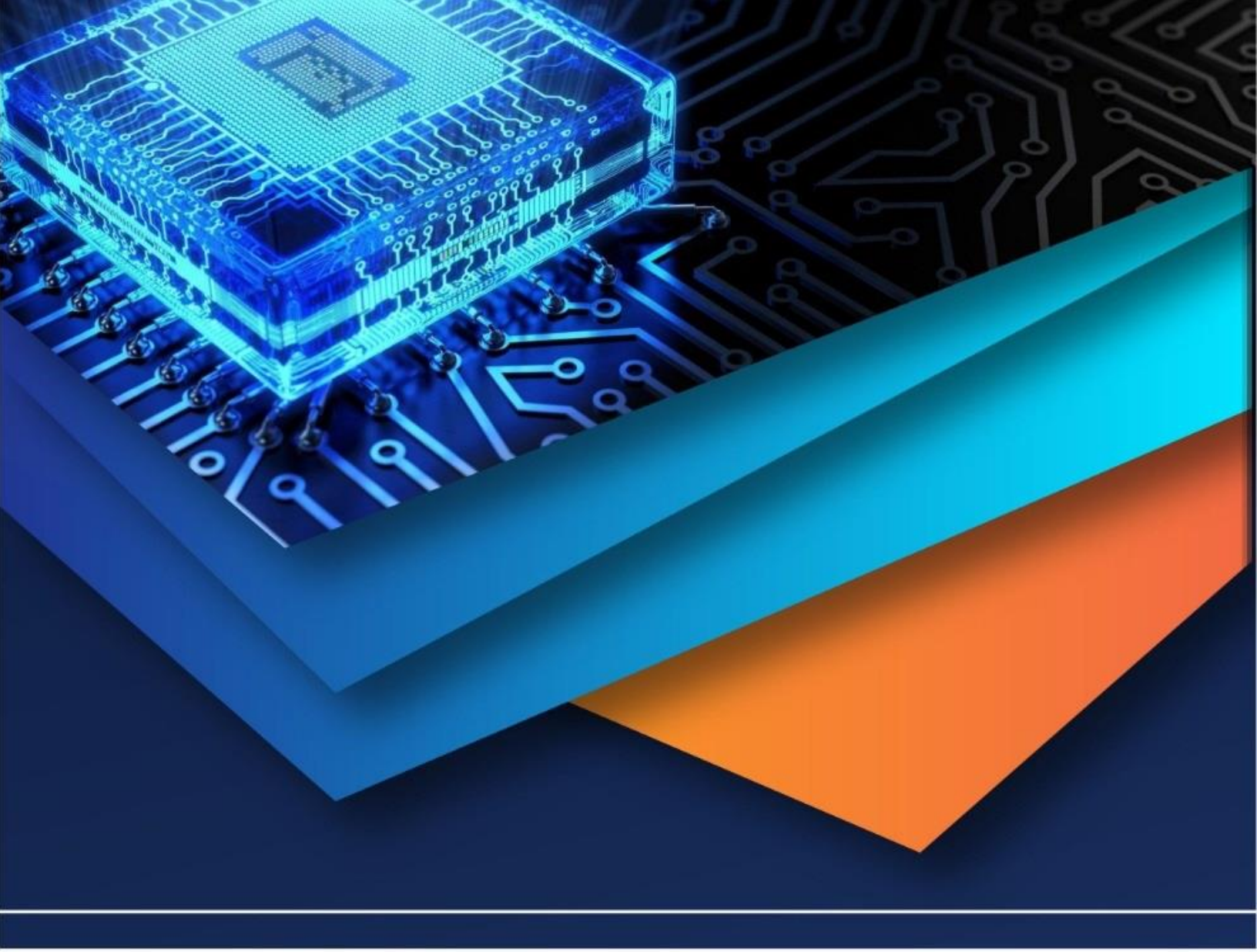

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