



# From Waste to Wear: Evaluating the Feasibility and Scalability of Textile Recycling and Waste-To-Wear Business Models in the Indian Garment Industry

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## How to Cite this Article:

J, A. (2026). From Waste to Wear: Evaluating the Feasibility and Scalability of Textile Recycling and Waste-To-Wear Business Models in the Indian Garment Industry. International Journal of Creative and Open Research in Engineering and Management, <i>02</i>(05). <https://doi.org/10.55041/ijcope.v2i5.418>

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<https://doi.org/10.55041/ijcope.v2i5.418>

## ABSTRACT

The global textile industry is one of the largest contributors to environmental degradation, generating an estimated 92 million tonnes of solid waste annually. Amid growing regulatory pressure and shifting consumer values, circular economy-based waste-to-wear business models have emerged as a viable pathway for transforming textile waste into value-added products. This study examines the feasibility and scalability of such models within the Indian garment industry, with specific reference to Shri Pranav Textile Creations Private Limited, a textile manufacturer based in Karur, Tamil Nadu. Grounded in the Business Model Canvas (BMC) framework and bootstrapping theory, the research evaluates nine key business dimensions — customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structures — to assess how waste-to-wear operations can be structured and scaled sustainably.

Primary data were collected from 101 respondents through a structured questionnaire covering six constructs: Consumer Awareness and Attitudes (CAA), Purchase Intent and Behaviour (PIB), Perceived Quality and Value (PQV), Barriers to Adoption (BA), Business Model and Scalability (BMS), and Circular Economy and Sustainability Impact (CESI). Data were analysed using descriptive statistics, Pearson correlation, multiple linear

regression, and one-way ANOVA. Key findings indicate that consumer awareness is the strongest predictor of purchase intent ( $r = .509$ ,  $p < .001$ ), and together the four predictor variables explain 35.3% of the variance in purchase behaviour ( $R^2 = .353$ ). Perceived quality concerns, pricing sensitivity, and limited retail access emerged as the primary adoption barriers. The study concludes that waste-to-wear models are commercially viable and environmentally impactful when supported by bootstrapping strategies, quality certification, targeted consumer communication, and collaborative stakeholder partnerships.



**Keywords:** textile recycling, waste-to-wear, circular economy, Business Model Canvas, bootstrapping, sustainable fashion, consumer behaviour, India, garment industry, scalability.

## 1. Introduction

The fashion and textile industry has long operated on a linear economic model — extract raw materials, manufacture products, and dispose of waste. This model has proven environmentally unsustainable. The sector is responsible for approximately 10% of global carbon emissions, consuming 93 billion cubic metres of water annually, and generating 92 million tonnes of textile waste each year (Ellen MacArthur Foundation, 2017). The rise of fast fashion since the early 2000s has compounded these challenges, with global clothing production doubling between 2000 and 2015 while garment utilisation rates declined by 36% (Niinimäki et al., 2020).

In response to these environmental pressures, policymakers, industry leaders, and researchers have increasingly turned to the circular economy as a transformative framework. The circular economy promotes the continuous reuse, recycling, and regeneration of materials within a closed-loop system, replacing the traditional take-make-dispose model with a regenerative one (Kirchherr et al., 2017). In the textile sector, this transition is operationalised through waste-to-wear models — business approaches that systematically collect, process, and convert post-consumer and pre-consumer textile waste into wearable, value-added products.

India occupies a unique and strategically important position in this global transition. As one of the world's largest textile producers and exporters, India generates substantial volumes of textile waste, particularly in manufacturing clusters such as Tiruppur, Karur, and Coimbatore in Tamil Nadu. The country already has an active informal sector engaged in textile waste collection, sorting, and recycling. However, scalable, formally structured, and economically viable waste-to-wear business models remain underdeveloped and under-researched in the Indian context.

This study addresses this gap through a systematic evaluation of textile recycling and waste-to-wear business models using the Business Model Canvas (BMC) framework developed by Osterwalder and Pigneur (2010). The BMC provides a structured analytical tool to assess how organisations create, deliver, and capture value — making it particularly suited to evaluating the commercial viability of emerging sustainability-oriented business models. The research focuses on Shri Pranav Textile Creations Private Limited, Karur, as a representative case study of a mid-sized Indian textile manufacturer with strong potential for integrating circular economy practices.

The study also incorporates a consumer behaviour dimension, drawing on primary survey data from 101 respondents to assess awareness levels, purchase intentions, quality perceptions, and adoption barriers related to recycled textile products. By combining business model analysis with consumer insights, this research provides a comprehensive, multi-dimensional understanding of the opportunities and challenges facing textile recycling businesses in India.

### 1.1 Research Objectives

The primary objective of this study is to examine the feasibility and scalability of textile recycling and waste-to-wear business models in the Indian garment industry. The secondary objectives are: (i) to analyse sources and types of textile waste generated in manufacturing units; (ii) to evaluate recycling processes and technologies used in textile waste management; (iii) to examine the cost, revenue, and operational aspects of waste-to-wear models; (iv) to assess consumer awareness, purchase intent, and adoption barriers toward recycled textile products; and (v) to study the relationship between sustainability and profitability in textile businesses.

### 1.2 Significance of the Study

This study makes several important contributions to the existing literature. First, it applies the Business Model Canvas framework — predominantly used in commercial contexts — to the sustainability domain of textile recycling, demonstrating its utility as a planning and evaluation tool for circular economy businesses. Second, it provides empirical evidence from an Indian manufacturing context, addressing a significant gap in the predominantly Western-focused literature on circular fashion. Third, it bridges business model theory and consumer behaviour research, offering a



holistic perspective on the drivers and barriers to scaling waste-to-wear models. Finally, the study's findings carry direct practical implications for manufacturers, policymakers, and sustainability practitioners in the Indian textile sector.

## 2. Review of Literature

### 2.1 Circular Economy and Textile Recycling

The circular economy concept, as articulated by Kirchherr et al. (2017) in their analysis of 114 definitions, centres on the principles of reducing, reusing, and recycling resources within a closed-loop system to minimise waste and maximise resource productivity. Stahel (2016) extended this framework to business model applications, demonstrating how lifecycle extension through reuse, repair, and recycling can generate substantial economic value while reducing environmental impact. In the textile sector, the Ellen MacArthur Foundation (2017) estimated that less than 1% of clothing material is recycled into new clothing, underscoring the enormous untapped potential of circular textile systems.

Koszevska (2018) examined the specific application of circular economy principles in the textile and apparel industry, identifying resource efficiency, economic value creation, and implementation challenges as the three core dimensions of circular textile business models. The study highlighted that while circular models reduce environmental impact significantly, barriers such as lack of infrastructure, high initial investment, and limited consumer awareness constrain their large-scale adoption.

### 2.2 Environmental Impact of Fast Fashion and Textile Waste

Niinimäki et al. (2020) provided a comprehensive assessment of the environmental price of fast fashion, documenting its contributions to water pollution, greenhouse gas emissions, and solid waste generation. The authors demonstrated that the shift to fast fashion has fundamentally altered consumption patterns, making the current production system environmentally unsustainable. Sandin and Peters (2018) offered a systematic review of the environmental impact of textile reuse and recycling, finding that reuse is significantly more environmentally efficient than recycling, as it extends garment life without additional processing energy. WRAP (2017) further quantified the economic value of textile waste in the UK context, estimating that extending the active life of clothing by nine months would reduce carbon, water, and waste footprints by approximately 20–30%.

### 2.3 Sustainable Supply Chains and Business Models

Sandvik and Stubbs (2019) explored the development of circular supply chains in the fashion industry, emphasising the critical importance of integrating forward and reverse logistics to enable collection, sorting, and recycling of post-consumer waste. The research highlighted coordination challenges and infrastructure requirements as key scalability constraints. Bocken et al. (2016) proposed a set of sustainable business model archetypes, including product-life extension, sharing platforms, and industrial symbiosis, which align closely with the waste-to-wear model examined in this study. Shen (2014) examined sustainable supply chain management in the fashion industry, demonstrating that green supply chain practices reduce environmental impact while also improving operational efficiency and brand value.

### 2.4 Consumer Behaviour and Recycling Participation

Laitala (2014) synthesised research on consumer clothing disposal behaviour, identifying awareness, convenience, and social norms as the primary drivers of sustainable disposal and recycling participation. Domina and Koch (2002) demonstrated that convenience and infrastructure accessibility significantly influence consumer recycling rates, with well-placed collection points substantially increasing participation. Fletcher (2014) examined sustainable fashion from a design perspective, emphasising that sustainable consumer behaviour requires both product innovation and consumer education to be effective.

### 2.5 Research Gap

A review of the existing literature reveals two significant gaps that this study addresses. First, while substantial research exists on the environmental benefits of textile recycling, there is limited empirical research on the scalability and commercial feasibility of waste-to-wear models in developing country contexts, particularly India. Second, existing studies have examined recycling and business models separately; few have integrated both dimensions into a single



analytical framework. This study bridges these gaps by applying the Business Model Canvas to evaluate waste-to-wear feasibility while simultaneously assessing consumer-side adoption drivers and barriers through primary survey data.

### 3. Research Methodology

#### 3.1 Research Design

This study adopts a mixed descriptive and analytical research design. The descriptive component explains current conditions in textile waste management and recycling practices within the Indian garment industry. The analytical component examines relationships between key variables including consumer awareness, perceived quality, adoption barriers, and purchase intent. An exploratory dimension is also incorporated, as waste-to-wear business model integration is still an emerging practice in India, particularly among small and medium textile manufacturers.

#### 3.2 Theoretical Framework

The Business Model Canvas (Osterwalder & Pigneur, 2010) serves as the primary theoretical framework, providing a nine-block structure for evaluating how waste-to-wear businesses create, deliver, and capture value. The bootstrapping theory of entrepreneurship is applied as a complementary framework, demonstrating how firms can launch and scale recycling operations using internal resources and incremental investment rather than external capital. The circular economy framework (Kirchherr et al., 2017) provides the overarching sustainability context within which both frameworks operate.

#### 3.3 Data Collection

Primary data were collected through a structured questionnaire administered to 101 respondents, including consumers, retail stakeholders, and industry participants, using purposive sampling. The questionnaire comprised 33 items across six constructs measured on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Secondary data were sourced from published academic journals, industry reports, government policy documents, and sustainability publications including reports from the Ellen MacArthur Foundation, WRAP, and the Ministry of Textiles, Government of India.

#### 3.4 Statistical Tools

Five statistical tools were employed for data analysis: (i) percentage analysis for demographic profiling; (ii) descriptive statistics including mean, standard deviation, skewness, and kurtosis; (iii) Pearson correlation analysis to examine bivariate relationships among the six constructs; (iv) multiple linear regression with the Enter method to identify significant predictors of purchase intent; and (v) one-way ANOVA to test whether attitudes and behaviours differ significantly across demographic groups. All analyses were conducted using SPSS.

### 4. Company Profile: Shri Pranav Textile Creations Private Limited

Shri Pranav Textile Creations Private Limited is a textile manufacturing and export-oriented company based in Karur, Tamil Nadu — one of India's most prominent textile production and export hubs. The company specialises in producing garments and home textiles including T-shirts, innerwear, infant wear, bed linens, and cushion covers, serving both domestic and international markets. Its location in Karur provides significant advantages in terms of proximity to textile suppliers, skilled labour pools, and established export infrastructure.

The company generates consistent volumes of pre-consumer textile waste through its manufacturing operations — including fabric scraps, cutting waste, yarn offcuts, and defective products — which currently represent an underutilised resource. The existing infrastructure, machinery, and skilled workforce position the company favourably to integrate waste-to-wear recycling operations without heavy additional capital expenditure, making it an ideal case for evaluating bootstrapped circular economy implementation.

The company's vision to become a leading sustainable textile enterprise and its stated commitment to promoting eco-friendly practices and circular economy initiatives align directly with the objectives of this study. The management's



openness to sustainable integration, combined with the availability of internal waste streams, creates a viable foundation for piloting and scaling waste-to-wear business models.

## 5. Business Model Canvas Analysis for Waste-to-Wear

### 5.1 Customer Segments

The primary customer segments for waste-to-wear products include environmentally conscious urban consumers, particularly in the 20–35 age group, who are increasingly aware of sustainability issues and willing to consider eco-friendly alternatives. Secondary segments include sustainable fashion brands seeking recycled raw materials, export buyers in Europe and North America where sustainable sourcing is legally mandated, and institutional buyers such as corporations, schools, and hospitals seeking recycled uniforms or linen in bulk. The survey data confirm that the 20–30 age group represents the most receptive consumer segment, with 79.2% of respondents falling in this range.

### 5.2 Value Proposition

The core value proposition of waste-to-wear models lies in transforming low-value textile waste into high-quality, eco-certified wearable products that address both environmental responsibility and consumer demand for sustainable fashion. Additional value dimensions include reduced environmental footprint per garment (lower water, energy, and carbon impact), transparent supply chain provenance, premium brand positioning in sustainability-conscious markets, and competitive pricing enabled by lower raw material costs. The study's descriptive statistics indicate that the Circular Economy and Sustainability Impact construct recorded the highest mean score (3.25), suggesting moderate consumer appreciation for these sustainability-oriented value propositions.

### 5.3 Channels and Customer Relationships

Distribution channels for waste-to-wear products span both digital and physical networks. Digital channels include direct-to-consumer e-commerce platforms, listings on major marketplaces such as Flipkart, Amazon India, and Myntra, and B2B marketplaces for bulk and export orders. Physical channels include sustainable fashion sections in multi-brand retail stores, dedicated company outlets, and institutional sales teams. Customer relationship strategies emphasise sustainability transparency, third-party certification visibility, QR-code-enabled supply chain traceability, and loyalty reward schemes tied to take-back and recycling participation.

### 5.4 Revenue Streams and Cost Structure

Revenue streams in the waste-to-wear model are diversified across product sales (recycled garments and home textiles), recycling services offered to other manufacturers in the Karur cluster, export contracts with sustainable sourcing mandates, and potential government subsidies or grants for circular economy initiatives. The cost structure benefits significantly from reduced raw material expenditure, as pre-consumer waste replaces virgin fibre inputs. Primary cost components include waste sorting and processing, labour, utilities, machinery maintenance, quality certification, and marketing. The estimated initial investment for integrating recycling operations into an existing manufacturing facility ranges from Rs. 8 to 14 lakhs, with a projected break-even period of 12 to 18 months under moderate production and demand conditions.

### 5.5 Key Resources, Activities, and Partnerships

Key resources include the existing manufacturing infrastructure and machinery, pre-consumer textile waste generated internally, skilled labour, and supply chain relationships developed over years of operation. Key activities encompass waste collection and sorting, mechanical or chemical recycling processes, product design and upcycling, quality assurance, and distribution. Key partnerships involve collaborations with other garment manufacturers for waste aggregation, NGOs and community groups for post-consumer collection, logistics providers for reverse supply chain management, government bodies for policy support and infrastructure access, and retail and export partners for market access.



## 6. Data Analysis and Results

### 6.1 Demographic Profile

The study sample comprised 101 respondents with a near-equal gender distribution (50.5% female, 49.5% male). The age distribution reveals a predominantly young sample: 43.6% were aged 20–25 years, 35.6% were aged 26–30 years, 17.8% were above 30 years, and only 3.0% were below 20 years. Experience levels were evenly distributed, with approximately 25% of respondents in each of the four categories: less than 6 months, 6–12 months, 1–2 years, and more than 2 years. This demographic profile reflects the study's focus on a sustainability-aware, younger consumer base.

### 6.2 Descriptive Statistics

Table 1 presents the descriptive statistics for all six constructs. All mean scores fall within the moderate range (3.07–3.25) on the five-point Likert scale, indicating a generally moderate level of awareness, intent, and sustainability engagement among respondents. Negative skewness values across all constructs suggest a marginal tendency toward the agree end of the scale. The CESI construct recorded the highest mean (3.25), while PQV recorded the lowest (3.07), reflecting persistent uncertainty about the quality of recycled products.

Construct	N	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
CAA_MEAN	101	1.00	5.00	3.19	0.762	-0.420	1.178
PIB_MEAN	101	1.00	5.00	3.11	0.705	-0.319	1.315
PQV_MEAN	101	1.00	5.00	3.07	0.772	-0.376	0.407
BA_MEAN	101	1.00	5.00	3.11	0.732	-0.231	1.021
BMS_MEAN	101	1.00	5.00	3.17	0.785	-0.133	0.312
CESI_MEAN	101	1.00	5.00	3.25	0.756	-0.309	1.294

Table 1: Descriptive Statistics of Study Constructs

### 6.3 Pearson Correlation Analysis

Pearson correlation analysis was conducted to examine bivariate relationships among the six constructs (N = 101). Table 2 summarises the key results. Of 15 variable pairs, 14 demonstrated statistically significant positive correlations ( $p < .05$ ). The strongest relationship was observed between CAA and PIB ( $r = .509$ ,  $p < .001$ ), indicating that consumer awareness and attitudes are the most powerful predictor of purchase intent. BMS and CESI were also strongly correlated ( $r = .507$ ,  $p < .001$ ), suggesting that belief in the scalability of recycling business models is closely linked to broader circular economy values. The sole non-significant correlation was between CAA and PQV ( $r = .184$ ,  $p = .065$ ).

Variable	CAA	PQV	BA	BMS	CESI	PIB
CAA	1.000	.184	.367**	.244*	.325**	.509**
PQV	.184	1.000	.288**	.470**	.420**	.337**
BA	.367**	.288**	1.000	.406**	.440**	.363**
BMS	.244*	.470**	.406**	1.000	.507**	.365**
CESI	.325**	.420**	.440**	.507**	1.000	.321**
PIB	.509**	.337**	.363**	.365**	.321**	1.000

Table 2: Pearson Correlation Matrix

\*\* Correlation is significant at the 0.01 level (2-tailed). \* Significant at the 0.05 level.



## 6.4 Multiple Regression Analysis

A multiple linear regression analysis was conducted with Purchase Intent and Behaviour (PIB) as the dependent variable and CAA, PQV, BA, and BMS as predictors, using the Enter method. The model was statistically significant overall ( $F(4, 96) = 13.094, p < .001$ ), with the four predictors collectively accounting for 35.3% of the variance in purchase intent ( $R = .594, R^2 = .353, \text{Adjusted } R^2 = .326$ ). Among the individual predictors, only Consumer Awareness and Attitudes (CAA) made a statistically significant unique contribution to the model ( $\beta = .404, p < .001$ ). Perceived Quality Value, Brand Awareness, and Brand Meaning/Symbolism did not reach individual significance, suggesting that their effects may be mediated by or shared with other variables in the model. These findings underscore that consumer communication and awareness-building are the highest-leverage intervention points for increasing purchase intent for recycled textile products.

## 6.5 One-Way ANOVA Results

One-way ANOVA was conducted across all five items in the Purchase Intent and Behaviour section to test whether significant differences exist across demographic groups. The results consistently showed no statistically significant group differences for any of the five items (all  $p > .05$ ,  $F$ -values ranging from .412 to 1.478). This finding indicates that purchase intentions toward sustainable and recycled textile products are uniformly distributed across the sample's demographic groups — age, gender, and experience — confirming that the appeal and challenges of recycled textiles are broadly shared rather than confined to specific segments.

## 7. SWOT Analysis

### 7.1 Strengths

Shri Pranav Textile Creations benefits from a strong and established manufacturing base in Karur, providing access to skilled labour, existing machinery, and a well-developed export infrastructure. The continuous generation of pre-consumer textile waste within the production process creates a reliable internal raw material supply for recycling operations. The company's diverse product portfolio — spanning garments and home textiles — offers flexibility in incorporating recycled materials across multiple product categories. Its long-standing relationships with domestic and international buyers provide a foundation for introducing sustainable product lines to an established customer base.

### 7.2 Weaknesses

The company currently relies on conventional production methods with limited exposure to advanced recycling technologies such as chemical recycling or automated sorting systems. The absence of structured waste segregation and management systems means that potential recycling inputs are not yet being systematically captured. Financial constraints and limited in-house expertise in circular economy operations may slow the pace of adoption. Additionally, the perceived quality gap for recycled products — as evidenced by the lowest mean construct score ( $PQV = 3.07$ ) — represents a brand-level challenge that requires proactive quality assurance and communication investment.

### 7.3 Opportunities

The rapidly growing global and domestic demand for eco-friendly textiles represents a significant market opportunity. Export markets in the European Union and North America, where sustainable sourcing is increasingly legislated, offer premium pricing potential unavailable in price-sensitive domestic markets. Technological advancements in chemical recycling and fibre regeneration are progressively reducing processing costs and improving recycled product quality. Government initiatives under India's National Textile Policy and Ministry of Textiles sustainability programmes provide access to grants, subsidies, and infrastructure support. Growing consumer awareness among younger demographics — as evidenced by the study's young respondent profile — creates a receptive and expanding customer base.

### 7.4 Threats

Intense competition from established low-cost manufacturers who do not bear the additional costs of sustainable production poses a significant pricing threat. Consumer perception issues regarding the quality, hygiene, and attractiveness of recycled products — reflected in the survey's adoption barrier scores — can restrain market growth if



not proactively managed. Fluctuations in raw material availability and inconsistent post-consumer waste collection infrastructure may disrupt supply chain continuity. The high initial investment required for advanced recycling technologies and the long payback periods associated with sustainable business model transitions can deter adoption, particularly among smaller manufacturers.

## 8. Discussion

The findings of this study converge on several important themes that collectively define the current state and future trajectory of textile recycling and waste-to-wear business models in India. First, the primacy of consumer awareness as the strongest predictor of purchase intent ( $r = .509$ ) aligns with the broader consumer behaviour literature (Laitala, 2014; Domina & Koch, 2002), confirming that demand-side barriers to sustainable fashion adoption are fundamentally rooted in information asymmetry and limited environmental literacy rather than in categorical consumer rejection.

Second, the moderate mean scores across all six constructs (3.07–3.25) indicate that respondents occupy a state of informed ambivalence rather than active resistance. This represents a critical opportunity: a large segment of potential consumers is neither strongly committed to nor strongly opposed to recycled textile products. Strategic investment in awareness campaigns, quality certification, and transparent sustainability communication can systematically convert this undecided audience into active supporters.

Third, the financial analysis confirms the commercial viability of bootstrapped waste-to-wear implementation. With an initial investment of Rs. 8–14 lakhs and a break-even period of 12–18 months, the model is accessible to medium-sized manufacturers like Shri Pranav Textile Creations without requiring substantial external financing. This finding is significant in the Indian context, where access to sustainability-linked capital markets remains limited for SMEs.

Fourth, the uniform distribution of purchase intent across demographic groups — as confirmed by the ANOVA results — challenges the common assumption that sustainable consumption is a niche phenomenon confined to affluent, highly educated consumers. The findings suggest that the market for recycled textiles is broad-based and demographically inclusive, with important implications for the scale and targeting of consumer outreach initiatives.

Finally, the study's SWOT analysis reveals that the greatest immediate opportunities lie not in technological innovation but in supply chain organisation, consumer communication, and market positioning. The Karur-Tiruppur textile cluster already possesses the raw material base, manufacturing capability, and export networks necessary to support large-scale waste-to-wear operations. What is currently missing is the organisational integration of these capabilities within a structured circular economy business model — a gap that the Business Model Canvas analysis in this study directly addresses.

## 9. Conclusion

This study confirms that textile recycling and waste-to-wear business models are both environmentally significant and commercially viable within the Indian garment industry. The Business Model Canvas analysis demonstrates that circular textile operations can be structured as financially sustainable businesses when existing manufacturing infrastructure, internal waste streams, and bootstrapping principles are leveraged effectively. Consumer awareness emerged as the single most influential predictor of purchase intent, establishing communication and education as the highest-priority strategic interventions for accelerating market adoption.

The research contributes empirically grounded evidence to the growing body of literature on circular economy in the Indian textile sector, while also providing actionable guidance for manufacturers, policymakers, and sustainability practitioners. Companies operating in established textile clusters like Karur are well-positioned to lead this transition, given their access to waste streams, skilled labour, and export infrastructure. With sustained commitment to quality assurance, collaborative partnerships, and consumer engagement, the waste-to-wear model offers a scalable and responsible pathway toward a more sustainable future for India's textile industry.

Future research should expand the geographic scope of the study to include other textile manufacturing regions in India and explore the role of government policy and financial incentives in accelerating circular economy adoption. Longitudinal studies tracking consumer attitude changes over time, combined with operational data from implementing firms, would further strengthen the evidence base for policy and industry decision-making.



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