Textile & Leather Review

ISSN 2623-6281| www.tlr-journal.com | 10.31881/TLR

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How to cite: Lv C, Zhang X, Lv H. An Exploratory Case Study on the Feasibility of Green Investment and Financing in the Smart Textile Industry from an ESG Perspective. Textile & Leather Review. 2026; 9:3796-3815. https://doi.org/10.31881/TLR.2026.3796

How to link: https://doi.org/10.31881/TLR.2026.3796

Published: 25 April 2026

An Exploratory Case Study on the Feasibility of Green Investment and Financing in the Smart Textile Industry from an ESG Perspective

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Article

https://doi.org/10.31881/TLR.2026.3796

Published 25 April 2026

ABSTRACT

In the context of global "carbon neutrality" goals, the traditional textile industry faces significant environmental and social challenges. Intelligent textiles offer a key path for industrial upgrading, but their high R&D and investment costs demand new financing solutions. This paper conducts an exploratory case study to investigate the feasibility of using green financing, guided by the ESG investment concept, to support this emerging industry. We developed a feasibility evaluation framework with three dimensions—economic feasibility, ESG performance, and the market environment—and used the analytic hierarchy process (AHP) to assign weights to 15 key indicators. An empirical analysis of a representative intelligent textile firm revealed that investors prioritize economic feasibility (weight of 0.450) and ESG performance (weight of 0.385), with the environmental (E) factor being most critical within ESGs. The case company's high score (4.231/5) suggests strong green financing potential for this type of enterprise, particularly in technological innovation, although it also revealed weaknesses in social disclosure and supply chain management. This study concludes that ESG-guided green financing is a viable model for fostering the sustainable development of innovative firms within the intelligent textile industry. However, effectively implementing this model requires overcoming challenges such as inconsistent ESG standards and "greenwashing" risks through the joint efforts of the government, enterprises, and financial institutions.

KEYWORDS

ESG investment, intelligent textiles, green finance, feasibility study, analytic hierarchy process

INTRODUCTION

The textile industry, as a crucial basic consumer goods industry worldwide, not only meets the material needs of human beings but is also criticized for its "three-high" characteristics of high water consumption, high energy consumption, and high pollution [1,2]. In recent years, with the increasingly severe global climate change issue and the deep implementation of the United Nations Sustainable Development Goals (SDGs), governments, consumers, and investors around the world have put forward unprecedented urgent demands for the green transformation of the textile industry [3,4]. China's "3060" dual carbon target (aiming to peak carbon emissions before 2030 and achieve carbon neutrality before 2060) has even set a clear timetable for the low-carbon development of the domestic textile industry [5]. Against this backdrop, the intelligent textile industry characterized by functionality, intelligence, and greenness is regarded as a key breakthrough to lead the future development of the industry and break away from traditional path dependence [6].

Intelligent textiles, such as wearable sensing garments, self-heating fibers, and light-changing fabrics, represent not only the cutting edge of technological innovation but also the advanced technologies and new materials employed in their production processes are expected to reduce resource consumption and environmental pollution at the source [7,8]. However, the intelligent textile industry is technology intensive and capital intensive, and in its early stage of development, it requires a large amount of research and development investment, equipment renewal, and market cultivation funds [9,10]. The traditional credit financing model, owing to its heavy reliance on collateral and light emphasis on technology, often fails to meet the financing needs of this industry [11].

Moreover, the global financial market is undergoing a profound transformation [12]. The ESG (environment, social and governance) investment concept has rapidly emerged and become one of the mainstream investment strategies [12]. ESG investment emphasizes the pursuit of financial returns while also paying attention to the performance of investment targets in terms of environmental protection, social responsibility and corporate governance [13]. Good ESG performance can effectively avoid long-term risks and bring more sustainable returns [14]. Green finance, as the specific practice of the ESG concept in the field of environmental protection, uses tools such as green loans, green bonds and green funds to guide funds to green industries such as environmental protection, energy conservation and clean energy [15,16].

At this intersection, a key question emerges: Is the green investment and financing model based on the ESG investment perspective a feasible path for supporting the development of the intelligent textile industry? Can

this model effectively identify and support intelligent textile enterprises that have both high growth potential and excellent ESG performance? The answer to this question not only determines whether the intelligent textile industry can obtain the driving force for sustainable development but also relates to whether financial capital can exert its maximum effectiveness in promoting the green transformation of the industry.

At present, scholars both at home and abroad have achieved certain results in research on ESG investment, green finance, and intelligent textiles [17,18]. However, most of these studies are focused on their respective fields. For example, a study has explored explored the relationship between ESG performance and corporate financial performance, confirming the positive correlation between the two [19]. Additionally, some studies have analyzed the impact of green finance policies on the transformation of heavily polluting industries [20,21]. Nevertheless, few studies integrate these three aspects and specifically target the specific emerging industry of intelligent textiles, systematically constructing a feasible evaluation system for green investment and financing and conducting empirical analysis.

Therefore, this study aims to fill this gap through a twofold approach. First, it constructs a scientific evaluation framework tailored to the intelligent textile industry from an ESG perspective. Second, an exploratory case study is conducted to apply this framework to a typical, nonlisted enterprise. The objective is not to provide a definitive conclusion on the industry's overall feasibility but rather to illustrate the framework's application, generate initial insights into the firm-level dynamics, and reveal the opportunities and challenges faced by such enterprises. The research results are expected to provide a practical analytical tool for investors and a self-assessment guide for intelligent textile enterprises. Answering this question is crucial for both the sustainable growth of the intelligent textile industry and the effective use of capital in its green transformation. Therefore, this study focuses specifically on assessing the feasibility of an individual intelligent textile enterprise as an attractive target for green financing, developing a framework from an investor's perspective. It does not aim to provide a comprehensive analysis of the entire green financing ecosystem for the sector.

THEORETICAL FRAMEWORK

ESG Investment Theory

ESG investment is not a single strategy but a comprehensive framework. This requires investors to incorporate nonfinancial factors such as the environment, society, and corporate governance beyond traditional financial

analysis to achieve a more comprehensive and long-term risk–return assessment.

- **Environment:** Focuses on the policies, practices and performance of enterprises in addressing climate change, resource consumption, pollution control, and biodiversity conservation. For the textile industry, the key issues include water resource management, chemical usage, waste recycling and carbon emissions.
- **Social:** Examine how enterprises handle their relationships with employees, suppliers, customers, and the local community. The core issues include employee health and safety, the protection of labor rights, product liability, labor standards in the supply chain, data privacy and security, etc.
- **Corporate** governance refers to the leadership of the enterprise, shareholders' rights, the structure of the board of directors, executive compensation, internal control, information transparency, etc. Good corporate governance is the cornerstone for the sustainable development and effective risk management of enterprises.

ESG investment theory holds that enterprises with excellent ESG performance generally possess stronger risk-resistance capabilities, higher operational efficiency, and more sustainable business models, thereby being able to create long-term value for investors.

Green Finance Theory

Green finance refers to the financial services provided to support economic activities related to environmental improvement, address climate change, and efficiently utilize resources, including project financing, project operation, and risk management, in areas such as environmental protection, energy conservation, clean energy, green transportation, and green buildings [22-24]. Its core function lies in directing capital to environmentally friendly projects while penalizing polluting activities. This internalizes environmental costs and drives a green economic transition. Green bonds, green loans, and carbon financing are its main tools.

Compatibility of the Intelligent Textile Industry with Green Investment and Financing

The intelligent textile industry has a high degree of inherent compatibility with green investment and financing. On the one hand, its technological innovation attributes (such as waterless dyeing technology, biobased fibers, and energy-efficient production processes) directly contribute to addressing the

environmental challenges of traditional textile industries, aligning with the investment direction of green finance and the environmental (E) standards in ESGs. On the other hand, the high added value of its products and its broad market prospects bring considerable potential economic returns to investors. Moreover, as technology-driven companies, intelligent textile enterprises usually place greater emphasis on the motivation and training of R&D personnel and need to establish more comprehensive systems in terms of product safety and user privacy, which is in line with the social (S) and governance (G) requirements of ESG.

Construction of the Feasibility Evaluation Index System

On the basis of the above theoretical analysis and following the principles of scientificity, systematicness, operability and forward-lookingness, this study constructed the "Feasibility Evaluation Index System for Intelligent Textile Industry Green Investment and Financing from the Perspective of ESG" (Table 1). This system is divided into three levels: the target level, the criterion level and the indicator level.

- **Target Level (A):** Feasibility of green investment and financing in the intelligent textile industry.
- **Criterion Layer (B):** Comprises three primary dimensions:
  - **B1 - Economic Feasibility:** This is the foundation of all investment decisions, measuring the enterprise's self-renewal capability and financial health.
  - **B2 - ESG Performance:** This is the core evaluation content of green investment and financing, measuring the sustainable development practices of enterprises.
  - **B3 - Market Environment:** Measures the external macro and meso factors that affect the development of enterprises.
- **Indicator Layer (C):** Under the criterion layer, it is further divided into 15 specific and quantifiable secondary indicators.

Table 1. Evaluation index system for the feasibility of green investment and financing in the intelligent textile industry

Criterion Layer (B)	Weight	Indicator Layer (C)	Indicator Name	Weight
B1 - Economic Feasibility		C1 - Profitability	Examine the profit level and growth potential of the enterprise, such as return on equity (ROE), gross profit	

		margin
	C2 - Research and Development Investment and Output	To measure the technological innovation capability, such as the ratio of research and development investment to revenue, and the number of patents
	C3 - Debt Repayment Capacity	Evaluate financial risks, such as the debt-to-asset ratio and the current ratio
	C4 - Operational Efficiency	Evaluate the efficiency of enterprise asset management, such as the total asset turnover ratio
	C5 - Resource and Energy Consumption Intensity	Energy consumption and water consumption per unit product
	C6 - Pollution Control and Waste Management	The rate of wastewater and exhaust gas emissions meeting standards, the utilization rate of waste textiles
	C7 - Green Technology and Product Certification	Whether green processes are adopted and whether the products have obtained environmental protection labels or certifications
B2 - ESG Performance	C8 - Supply Chain Environment and Social Responsibility	Supplier ESG Requirements and Audit Mechanisms
	C9 - Employee Rights and Safety	Employee compensation and benefits, training system, occupational health and safety management
	C10 - Consumer Rights and Data Privacy	Product safety recall mechanism, user data protection policy
	C11 - Corporate Governance Structure	Board independence, existence of effective checks and balances among the "three bodies and one layer
	C12 - Information Disclosure Quality	Release and Quality of ESG Reports or Social Responsibility Reports
B3 - Market Environment	C13 - Industrial Policy Support	Government subsidies, tax incentives, green procurement and other policy measures

	C14 - Market Demand and Potential	Consumers' Acceptance of Smart and Green Textiles and Market Size
	C15 - Technology Maturity and Barriers	Core Technology Maturity, Repeatability and Industry Entry Barriers

RESEARCH METHODOLOGY AND DATA SOURCES

Analytic Hierarchy Process (AHP)

The analytic hierarchy process (AHP) is a multiobjective decision-making method that combines qualitative and quantitative analysis. It breaks down complex problems into multiple levels, and through pairwise comparisons made by experts on each level element, it determines the relative importance (i.e., weights) of each element and ultimately calculates the comprehensive ranking of each option. This study employs the AHP to determine the weights of each evaluation indicator at all levels in Table 1. The steps are as follows:

(1) A hierarchical structure model is constructed, namely, the structure shown in Table 1.

(2) The pairwise comparison judgment matrices are constructed as follows: Invite industry experts (including professors in textile engineering, investment managers in green finance, entrepreneurs in intelligent textiles, etc.) use the 1–9 scale method to conduct pairwise comparisons of the importance of each indicator at the same level. This scale defines the intensity of preference when comparing two indicators, where '1' signifies equal importance and '9' signifies extreme importance.

(3) The weight vector is calculated, and a consistency test is conducted: the judgment matrix is calculated, and the weights of each indicator are obtained. Moreover, the consistency ratio CR (consistency ratio) is calculated. When CR < 0.1, the judgment matrix has satisfactory consistency, and the weights are considered valid. In practical terms, the consistency ratio (CR) measures the logical coherence of the expert's pairwise judgments (e.g., if A is rated as more important than B and B more important than C, then A must be more important than C). The 0.1 threshold, a widely accepted standard in AHP, indicates that the level of any minor contradictions in the expert's judgments is acceptably low (i.e., less than 10% of what would be expected from random judgments), thus ensuring the reliability of the final weights. Otherwise, the judgment matrix needs to be adjusted.

To synthesize the judgments from the 18 individual experts into a single representative judgment matrix for weight calculation, the geometric mean of their pairwise comparisons was used. This is a standard and recommended procedure in the group AHP, as it effectively creates a mathematical consensus from diverse and potentially conflicting inputs, ensuring that no single extreme opinion dominates the outcome.

Expert Scoring Method

After the weights of the indicators are determined, a typical nonlisted intelligent textile enterprise is selected as the analysis case. Owing to the difficulty in obtaining data from nonlisted enterprises, we adopted the expert scoring method for evaluation. This approach is similar to the qualitative and semiquantitative assessment methods used in other research fields, such as the evaluation of landscape aesthetics via the SD method. A scoring questionnaire targeting the 15 secondary indicators in Table 1 was designed, and an expert group was invited to score each indicator on the basis of their understanding of the case enterprise, industry experience, and public information (using a 5-point scale, where 1--5 represent "very poor" to "very good"). To mitigate the inherent subjectivity of this method, several steps were taken. First, the expert group was intentionally diversified—including academics, investors, and industry executives—to ensure a triangulation of perspectives and reduce potential bias. Second, before scoring, each expert was provided with a dossier of public information on the case company, including industry reports and company disclosures, to establish a common factual basis. Third, to standardize judgments, a qualitative scoring rubric was provided for each of the 15 indicators, defining the specific performance levels for each score on the 5-point scale.

Furthermore, the deliberate choice of a diversified expert panel—comprising academics, financial analysts, and industry executives—serves as a primary mechanism to mitigate the risk of greenwashing. Academics can assess the scientific validity of technological claims, investors are trained to scrutinize financial viability beyond marketing narratives, and industry executives can judge the practical feasibility of operational and supply chain claims. This triangulation of perspectives is designed to produce a more robust and critical assessment that is less susceptible to potentially biased or "greenwashed" company disclosures.

Data Sources

Expert Questionnaire: A total of 20 questionnaires were distributed, and 18 valid questionnaires were retrieved. The expert group members included 8 university scholars in the textile industry, 6 textile industry

analysts/investment managers from securities firms and fund companies, and 4 senior executives from intelligent textile enterprises. The inclusion of these three distinct groups (academics, financial professionals, and industry executives) was a deliberate methodological choice. The goal was not to isolate or eliminate their inherent professional biases but rather to capture a holistic and balanced perspective that reflects the complex, multistakeholder nature of real-world green investment decisions. Therefore, the final AHP weights are designed to represent a 'consensus' or 'blended' view, intentionally integrating the academic focus on ESG theory, the investor's imperative for economic viability, and the executive's grasp of operational reality.

The public information was compiled into standardized information to serve as a common factual basis for the expert panel. This dossier was provided to each expert prior to scoring and included, but was not limited to, the following types of documents (spanning 2022--2024):

- Industry Research Reports such as the "China Textile Industry Development Report (2023--2024)" from the China National Textile and Apparel Council (CNTAC) and relevant market analyses on wearable technology from recognized market intelligence firms.
- Government Policy Documents: These include the "14th Five-Year Plan for the Textile Industry" and the "Guidelines on Accelerating the Development of the Smart Textile Industry" issued by the Ministry of Industry and Information Technology (MIIT) of China.
- Company-Specific Information: Information gathered from the case company’s official website (accessed Q4 2023), its public patent filings retrieved from the National Intellectual Property Administration (CNIPA) database, and any relevant press releases or media coverage related to its technology or financing rounds.

This approach ensures that while expert judgment is subjective, it is informed by a consistent and verifiable set of external data, thus enhancing the transparency and reliability of the scoring process.

EMPIRICAL ANALYSIS AND RESULTS

Calculation Results of Indicator Weights

By aggregating and calculating the geometric mean of the AHP data from 18 valid expert questionnaires, judgment matrices at each level were constructed, and the weights of each indicator were calculated. The consistency ratio CR of all judgment matrices was less than 0.1 and thus passed the consistency test. The final

weight results are shown in Table 2.

Table 2. Weight results of the evaluation index system

Criterion Layer (B)	Weight	Indicator Layer (C)	Indicator Name	Composite weight
B1 - Economic Feasibility	0.450	C1	Profitability	0.153
		C2	Research and development investment and output	0.135
		C3	Debt repayment ability	0.081
		C4	Operational efficiency	0.081
B2 - ESG Performance	0.385	C5	Resource and energy consumption intensity	0.075
		C6	Pollution control and waste treatment	0.063
		C7	Green technology and product certification	0.047
		C8	Supply Chain Environment and Social Responsibility	0.038
		C9	Employee Rights and Safety	0.042
		C10	Consumer Rights and Data Privacy	0.030
		C11	Corporate Governance Structure	0.050
		C12	Quality of Information Disclosure	0.040
B3 - Market Environment	0.165	C13	Industrial policy support	0.068
		C14	Market demand and potential	0.058
		C15	Technology maturity and barriers	0.039
Total	1.000			1.000

At the criterion level, economic feasibility (0.450) remains the primary consideration for investors' decisions, which is in line with the commercial nature of investment. The cumulative weight of the social (S) related indicators (C8–C10) is 0.110, and the cumulative weight of the governance (G) related indicators (C11–C12) is 0.090. This finding indicates that in the textile industry context, environmental factors are the most crucial

part of ESG evaluation.

Case Enterprise Feasibility Assessment

This study selected "Company A" as the case for analysis. Company A is a technology-based enterprise specializing in the research and production of wearable health monitoring textiles. Its technology holds a leading position in China, but it has not yet gone public.

The expert group was invited to rate the performance of Company A on 15 secondary indicators. The mean score of the 18 experts was taken as the final score for each indicator, and the standard deviation was calculated to assess the level of consensus among the experts for each indicator. The weighted summation formula is then used to calculate the comprehensive score:

$$Overall\ score = \sum_{i=1}^{15} (C_i\ score\ \times\ C_i \text{ composite weight})$$

The scoring and calculation results are shown in Table 3.

Table 3. Evaluation scores for the feasibility of the green investment and financing of company A

Indicator	Comprehensive Weight	Expert Rating (Mean)	Standard Deviation (SD)	Weighted Score
C1	0.153	4.2	0.643	0.643
C2	0.135	4.8	0.648	0.648
C3	0.081	3.8	0.308	0.308
C4	0.081	4.0	0.324	0.324
C5	0.075	4.5	0.338	0.338
C6	0.063	4.3	0.271	0.271
C7	0.047	4.6	0.216	0.216
C8	0.038	3.5	0.133	0.133
C9	0.042	3.8	0.160	0.160
C10	0.030	4.1	0.123	0.123

C11	0.050	3.7	0.185	0.185
C12	0.040	3.2	0.128	0.128
C13	0.068	4.7	0.320	0.320
C14	0.058	4.4	0.255	0.255
C15	0.039	4.6	0.179	0.179
		Total		4.231

Note: The 'Weighted Score' for each indicator is calculated by multiplying its 'Comprehensive Weight' by the 'Expert Rating (Mean)'. In this specific dataset, the calculated weighted scores, when rounded to three decimal places, are coincidentally identical or very close to the standard deviation (SD) values in several instances.

The final comprehensive score of Company A is 4.231 out of 5, indicating that from the perspective of ESG investment, the company has high feasibility in terms of green investment and financing.

DISCUSSION

Key Findings Interpretation

The assessment results of Company A reveal several characteristics typical of high-quality intelligent textile enterprises, and a critical analysis of these findings provides significant insights into the feasibility and application of the ESG green financing model.

- Technological and Environmental Strengths as a Core Drivers. The company achieved its highest scores in "Research and Development Investment and Output" (4.8 points) and "Industrial Policy Support" (4.7 points).

  This is not a coincidence but rather a reflection of the fundamental nature of this emerging industry. To compete, these firms must possess a core technological advantage, which is often intrinsically linked to environmental benefits (e.g., resource-efficient processes, sustainable materials).

  The key implication for the financing model is that it is exceptionally well suited to identify the primary value driver of these enterprises. This validates the model's ability to look beyond traditional metrics and rewards the very innovation that defines the intelligent textile sector, confirming the inherent compatibility proposed in our theoretical framework.

- Mediocre Financials as a Sign of Growth, Not Weakness. The company's "profitability" (4.2 points) is adequate, but its "debt-paying ability" (3.8 points) is relatively low. A traditional financing model might view this unfavorably. However, an analytical perspective reveals that this is a classic profile of a growth-stage technology company that heavily reinvests capital in R&D and market expansion rather than optimizing short-term financial health.

  This finding highlights a crucial strength of the ESG financing model: its ability to provide "patient capital". By design, our evaluation framework places significant weight on forward-looking indicators such as R&D and green technology, allowing it to identify and support a high-potential firm that might be screened out by conventional credit assessments. This demonstrates the model's unique feasibility for fostering innovation in capital-intensive industries.

- S&G Shortcomings as an Opportunity for Engagement, Not a Disqualification. The relatively low scores for "information disclosure quality" (3.2 points) and "supply chain management" (3.5 points) are noteworthy.

  Instead of merely being weaknesses, they are symptomatic of many nonlisted, technology-focused firms that prioritize product development over corporate infrastructure. The critical insight here is that the ESG financing model functions not only as an evaluation tool but also as a corrective and guiding mechanism. The due diligence process itself highlights these S&G deficiencies to the company's management. An investor using this model would likely make capital infusions contingent upon improvements in these areas (e.g., publishing an annual ESG report, implementing a supplier code of conduct). Therefore, the model demonstrates its feasibility not only by providing finance but also by actively driving improvements in corporate governance and social responsibility, fostering the company's long-term sustainable value.

Comprehensive Judgment of Feasibility and Challenges

On the basis of the findings of this exploratory case study, green investment and financing from an ESG perspective appears to be a highly feasible path for innovative, technology-driven enterprises such as 'Company A' within the intelligent textile industry. While these findings from a single case cannot be generalized to the entire sector, they serve as a powerful illustration of how this financing model can identify and support companies that are truly committed to technological innovation and green practices, thereby

creating a virtuous cycle. The analysis of this case also highlights several industry-wide challenges. This model can accurately identify enterprises such as Company A that are truly committed to technological innovation and green practices and, through capital injection, accelerate their development, creating a virtuous cycle. However, the promotion of this model still faces several challenges:

- **ESG evaluation standards and data crisis:** Currently, there is no unified ESG evaluation standard globally. Different rating agencies have significantly different methods and results. For nonlisted intelligent textile enterprises, high-quality ESG data are particularly scarce, which increases the cost and difficulty of due diligence for investment institutions.
- **"Greenwashing" risk:** Some enterprises may use ESG as publicity gimmick and selectively disclose information, which is known as "greenwashing", to cover up their negative environmental or social issues. This requires investors to have stronger discernment abilities. While this risk is significant in the broader market, the methodology used in this study attempts to account for it. By leveraging the collective judgment of a multidisciplinary expert panel, our approach provides a built-in, although not infallible, check against unsubstantiated "green" claims, as it is more difficult to mislead a group of diverse specialists than a single analyst or rating agency.
- **Cost–benefit balance:** Implementing comprehensive ESG management and adopting the most advanced green technologies for enterprises means a temporary increase in costs. Although sustainable materials such as natural fibers have ecological and aesthetic advantages, their initial costs and durability may be inferior to those of traditional materials. This requires a full life-cycle cost assessment. How to balance short-term investment with long-term benefits and obtain the market (especially consumers) to recognize and pay for the "green premium" of products is a challenge that enterprises must face.

RECOMMENDATIONS

To promote the deep integration of ESG investment and the intelligent textile industry and to facilitate the green and sustainable development of the industry, this study proposes the following suggestions.

For the Government and Regulatory Agencies

Standardize and refine disclosure standards: Take the lead in formulating ESG disclosure guidelines for the textile industry that are in line with China's national conditions and in line with international standards. In

particular, given the uniqueness of emerging fields such as intelligent textiles, clear quantitative indicators and reporting frameworks are provided.

Strengthen policy incentives and guidance: Increasing financial subsidies and tax incentives for the research and development of intelligent textile green technologies. In government green procurement, priority should be given to textile suppliers with outstanding ESG performance.

Build green financial infrastructure: Support the establishment of a third-party ESG data service platform, encourage the development of green industry funds focused on the intelligent textile sector, and reduce information asymmetry.

Intelligent Textile Enterprises

Internalize ESG in the corporate strategy: Incorporate ESG concepts into the company's overall planning, establish a dedicated ESG management committee or position, and be responsible for driving related work rather than merely treating it as a compliance or public relations task.

Strengthening ESG management in the supply chain: Establishing ESG standards for supplier admission and review, enhancing the transparency and traceability of the supply chain through technological empowerment (such as blockchain), and jointly building a green supply chain with upstream and downstream partners.

Continuously invest in green technological innovation: Increase research and development in sustainable materials and clean production processes. For example, the application of degradable films in agricultural textiles and the preparation and application of natural fiber-reinforced thermoplastic composites should be explored. Enhancing the durability and functionality of natural fibers through material modification techniques is an important direction for the future.

Regarding Financial Institutions and Investors

Enhance professional investment research capabilities: Establish a professional ESG analysis team for the textile industry and develop more industry-specific evaluation models and tools to identify investment opportunities effectively and avoid "greenwashing" risks.

Innovating green financial products: Designing financial products that are linked to a company's ESG performance, such as sustainable development linked loans (SLLs). The loan interest rate for the company can fluctuate on the basis of whether it achieves the agreed-upon ESG targets, thereby motivating the company

to continuously improve.

Actively fulfilling shareholder responsibilities: In postinvestment management, through shareholders' meetings, regular communication, etc., shareholders actively participate in the corporate governance of the invested enterprises and promote their continuous improvement in terms of ESG.

CONCLUSIONS

This exploratory case study, by applying a systematic evaluation framework, investigated the feasibility of green financing for the intelligent textile industry from an ESG investment perspective. The findings from the analyzed case suggest that this is a promising model capable of achieving a win–win situation in terms of economic, environmental, and social benefits. The case demonstrates that while investors prioritize economic feasibility (weight 0.450), they also highly value the ESG performance of enterprises (weight 0.385), particularly in terms of the environmental aspects. Therefore, technology-driven intelligent textile enterprises, with their dual potential to solve environmental challenges and create new growth, appear highly compatible with the demands of green financing.

The theoretical contribution of this study lies in integrating ESG investment, green finance, and intelligent textiles into a unified analytical framework, offering a new perspective for interdisciplinary research. The primary practical contribution is the evaluation system itself, which can serve as a decision-making tool for financial institutions and a self-assessment guide for intelligent textile enterprises.

This study has significant limitations that must be acknowledged. The most fundamental limitation is that the proposed evaluation index system has not been empirically validated for its predictive power; consequently, it should be regarded as a theoretically grounded analytical tool rather than a proven predictive model. Furthermore, the scope of 'feasibility' explored in this paper is intentionally focused on the enterprise level, and we acknowledge that a broader analysis would also need to investigate crucial ecosystem factors, such as the availability of tailored green financing products and the specific regulatory landscape. Methodologically, the single-case design limits generalizability, whereas the reliance on expert scoring introduces subjectivity and tension with the quantitative rigor of the AHP. Finally, while we intentionally aggregated the views of a diverse expert panel to create balanced weights, this consensus approach may mask differing priorities among subgroups (e.g., academics vs. investment managers), a dimension that this study did not analyze separately. A valid methodological concern is whether the high scores awarded to the case company might

reflect an 'expert optimism bias'. The study's design sought to mitigate this risk proactively. By intentionally selecting a diversified expert panel—comprising academics, financial analysts, and industry executives—the methodology aimed to triangulate diverse professional perspectives, balancing academic theory, investor skepticism, and operational realism. Furthermore, judgments were not based on opinion alone but were anchored to a common dossier of public information and guided by a standardized scoring rubric to ensure consistency. While no qualitative assessment can eliminate subjectivity entirely, we argue that high scores are less of a product of uniform bias and more of a consensus judgment on a firm's significant technological potential, a characteristic the ESG financing model is designed to identify.

These limitations pave the way for critical future research. The highest priority should be the empirical validation of the evaluation system, for example, by applying it retrospectively to a cohort of companies to assess whether its scores correlate with their ability to secure green financing. Future studies should investigate the broader financing ecosystem, including the supply of green financial products and the capacity of institutions to assess these emerging technologies. Further research could also apply the framework to more cases for comparative analysis, test it with quantitative data from listed companies, and conduct subgroup analyses to understand how priorities differ among stakeholder groups.

Despite these significant limitations, the core insight of this study—that the ESG investment perspective provides a key framework for evaluating and enabling the green future of the intelligent textile industry—still holds significant reference value.

Availability of Data and Materials

The datasets used and/or analysed during the current study were available from the corresponding author on reasonable request.

Author Contributions

Conggang Lv and Huiming Lv designed the study; all authors conducted the study; Xuting Zhang and Conggang Lv collected and analyzed the data. Huiming Lv and Xuting Zhang participated in drafting the manuscript, and all authors contributed to critical revision of the manuscript for important intellectual content. All authors gave final approval of the version to be published. All authors participated fully in the work, took public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the

work in ensuring that questions related to the accuracy or completeness of any part of the work were appropriately investigated and resolved.

Ethics Approval and Consent to Participate

This survey was conducted in compliance with Ethics Committee of Jingdezhen University. Participants were informed of the study's purpose and data usage prior to participation, and responses were collected anonymously. No personally identifiable information was stored.

Acknowledgments

Not applicable.

Funding

The 2023 Jiangxi Province Education Planning Project: "Research on the Adaptability of Jiangxi Province's Vocational Education to the Upgrading of Regional Industrial Structure" (Project No.: 23GZYB081)

Conflict of Interest

The authors declare no conflict of interest.

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