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Research Article

ESG Assessment of 12 Chinese SMEs: The Proposal of a Two-stage Framework

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Abstract

This report presents a comprehensive ESG (Environmental, Social, and Governance) assessment of twelve small and medium-sized enterprises (SMEs) across diverse industrial sectors in China. Given that SMEs account for over 99 percent of all market entities in China and contribute more than 60 percent of national GDP, understanding their ESG posture is critically important. However, SMEs face systemic challenges in ESG evaluation due to resource constraints, lack of specialized expertise, and the absence of standardized, scalable assessment methodologies. The assessment employed a forty-indicator framework adapted from the China City Index of Venture (CCIV) seven-pillar model, organized across environmental, social, and governance dimensions. Data were collected through semi-structured interviews with senior representatives of twelve purposively selected SMEs between October 2025 and January 2026. The findings reveal uniformly low ESG maturity across all twelve cases, with total scores ranging from 9 to 28 out of 120 (7.5% to 23.3%), all at the Initial maturity level. The assessment identified a consistent "awareness-without-action" phenomenon, where senior managers acknowledged ESG importance but had not translated awareness into formal management systems due to absence of regulatory mandates, cost concerns, and resource constraints. Supply chain management emerged as the critical weakness across all cases. Company size positively correlated with ESG maturity, while company age was not a reliable predictor. Sectoral patterns revealed that environmentally oriented, socially mission-oriented, and professionally regulated sectors exhibited relatively stronger performance in their respective dimensions. The report concludes with implications for policy and practice, emphasizing the need for sector-specific ESG frameworks, accessible assessment tools, and promotion strategies that emphasize the business case for sustainability. The findings establish the necessity for a Stage II in-depth assessment to validate and elaborate upon the baseline findings, forming the basis of a two-stage ESG assessment framework for Chinese SMEs.

Keywords

ESG Assessment, Small and Medium Enterprises, China, Sustainability, Two-stage Framework

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1. Background and Necessity for SME ESG Assessment

1.1. The Strategic Importance of ESG for SMEs

Environmental, Social, and Governance (ESG) criteria have emerged as integral drivers of corporate sustainability [12], investor strategy [35], and regulatory adherence [25]. While large enterprises often leverage robust institutional frameworks for ESG disclosure, the current body of literature is heavily weighted toward the study of large corporations [40]. Small and Medium Enterprises (SMEs), by contrast, face systemic challenges [6, 20] in evaluating and advancing their ESG performance, hindered by resource constraints [25], a lack of specialized expertise [36], and the absence of standardized, scalable assessment methodologies [6, 21].

The formal categorization of SMEs in China is governed by the Interim Categorizing Criteria on Small and Medium-sized Enterprises, a policy enacted in 2003 under the legal foundation of the SME Promotion Law. The criteria stipulate a multithreshold classification system based on three quantitative indicators: number of employees, total assets, and annual business revenue, with varying benchmarks across industrial sectors [26]. SMEs collectively account for more than 99 percent of all market entities in China, contribute no less than 60 percent of the national Gross Domestic Product, and are responsible for creating more than 82 percent of the country's employment opportunities [26]. The aggregate economic significance of SMEs therefore renders their ESG posture a matter of national strategic concern, not merely an individual firm-level issue.

1.2. The Economic Case for ESG Integration

ESG compliance has transitioned from a voluntary initiative to a strategic necessity [14] for SMEs, driven by escalating regulatory mandates [22], supply chain expectations [42], and evolving stakeholder demands [41]. Global regulators are institutionalizing stringent ESG disclosure requirements, exemplified by the EU Corporate Sustainability Reporting Directive (CSRD) [11], and noncompliance exposes SMEs to financial penalties [18]. More than half of China's carbon dioxide emissions are attributable to SMEs [28], and the consumption of fossil fuels additionally generates sulphur dioxide, nitrogen oxides, and soot emissions [19]. SMEs in carbon-intensive industries face mounting fiscal pressures [39] from emissions pricing mechanisms, including carbon taxes [8, 15] and cap-and-trade systems [38], necessitating ESG-aligned operational efficiencies to mitigate cost escalation.

A positive correlation exists between the implementation of sustainability practices and superior financial performance in SMEs [31]. Organizations lacking sustainability-oriented operational competencies incur significant financial and operational liabilities, and SMEs deficient in sustainability expertise often fail to identify material ESG risks [31], exposing themselves to reputational harm and stakeholder distrust [24]. Consequently, SMEs lacking auditable ESG metrics risk exclusion from high-value contracts [32]. Noncompliance with partner-mandated ESG performance thresholds may result in exclusion from procurement tenders, thereby imperilling strategic partnerships and eroding enterprise viability.

Financial institutions, including the European Central Bank's green lending frameworks [34] and institutional investors, now systematically integrate ESG performance metrics into capital allocation strategies [5, 23], effectively marginalizing noncompliant entities from liquidity access. This trend establishes a direct link between ESG performance and investor expectations, transforming financial incentives by rewarding robust ESG profiles with lower capital costs and preferential investment. Mishra et al. [29] note that SMEs exhibiting ESG alignment concurrently secure competitively priced financing through instruments such as sustainability-linked bonds and green loans [9], thereby bolstering fiscal resilience and long-term financial stability [4].

Reputational equity is increasingly influenced by consumer demand for environmental and social responsibility. Empirical market research indicates a strong consumer preference for sustainable products: a 2020 McKinsey U.S. consumer sentiment survey found that more than 60 percent of respondents are willing to pay a premium for products with sustainable packaging, while a NielsenIQ study reports that 78 percent of U.S. consumers consider a sustainable lifestyle important [27]. SMEs with verified ESG credentials gain competitive leverage in saturated markets. It is theoretically and empirically established that consumers exhibit a marked preference for purchasing from environmentally conscious firms, frequently demonstrated through a greater willingness to pay for products perceived as "clean" [3].

1.3. Barriers to ESG Adoption Among SMEs

Despite this growing imperative, SMEs face significant barriers in adopting ESG practices due to the limitations of existing assessment systems [2], most of which are primarily designed for large corporations. A discernible gap exists in ESG disclosure quality and financial flexibility between firms of different sizes: larger firms generally possess more capital, exhibit higher-quality ESG disclosures, and encounter fewer external financing constraints, while smaller firms are more likely to exhibit lower-quality ESG disclosure [10]. To achieve corporate profits that are environmentally and socially responsible, boards and management of SMEs must address two critical obstacles: the ESG issue-assessment barrier, stemming from an organization's difficulty in equitably evaluating, prioritizing, scoping, and planning ESG initiatives; and the shareholder-value barrier, which arises from the deeply insti-

tutionalized belief that a firm's primary obligation is to maximize shareholder returns—a mindset that often generates internal resistance to substantive ESG measures [37].

Current ESG practices are expensive [14], ranging from a few thousand US dollars [7] to an average of USD 1,498,673 [17], amounts that are unaffordable for SMEs with limited financial resources [30]. Additionally, ESG systems typically require specialized personnel to interpret complex frameworks like the Global Reporting Initiative (GRI) or Sustainability Accounting Standards Board (SASB) [13, 33]—a challenge for SMEs lacking in-house sustainability experts [1]. Furthermore, current standardized ESG assessment methodologies often overlook sector-specific operational realities [16], resulting in the application of non-contextual metrics or misaligned performance benchmarks. In the absence of customized frameworks, SMEs encounter significant challenges in aligning with escalating regulatory mandates.

2. ESG Assessment Framework for SME

2.1. Introduction to ESG Assessment for SMEs

ESG assessment provides a structured means of evaluating how small and medium-sized enterprises (SMEs) manage environmental, social, and governance responsibilities. For SMEs, assessment serves a different purpose than for large corporations: rather than supporting investor disclosure, it functions as a diagnostic and developmental tool that helps owner-managers identify gaps, prioritise improvements, and demonstrate credibility to supply chain partners and financiers [2, 6, 30]. Effective SME assessment must therefore satisfy three conditions. First, it must be contextually appropriate, reflecting the regulatory environment, industrial structure, and cultural norms in which Chinese SMEs operate [40]. Second, it must be operationally feasible, requiring only the limited personnel, time, and technical capacity that SMEs can realistically commit [1, 14]. Third, it must be diagnostically useful, generating actionable improvement recommendations rather than a composite score alone [31, 37]. Existing frameworks—including GRI and SASB—were designed primarily for large, resource-rich firms and assume data infrastructure and specialist expertise that most SMEs lack [13, 33]. Consequently, a dedicated SME assessment framework is required: one that translates established ESG principles into indicators proportionate to SME scale, and that supports progressive maturity development rather than one-off compliance reporting [21, 36].

2.2. The Forty-Indicator Assessment Instrument

The forty-indicator instrument is organized across three dimensions:

Environmental Dimension (15 indicators) covering:

1) Carbon reduction and climate change: Scope 1, 2, and 3 emissions calculation (E11-E13), third-party verification of carbon data (E14), carbon reduction targets (E15), carbon reduction achievement records (E16), climate change impact assessment (E17)
2) Resource efficiency and circular utilization: Regular electricity consumption monitoring (E21), regular water consumption monitoring (E22), recycling facilities provision (E23), general waste data collection (E24), recycled material data collection (E25), resource efficiency targets (E26), climate change mitigation measures (E27), environmental charter or covenant (E28)

Social Dimension (20 indicators) covering:

1) Labour and human rights: Labour rights protection policy (S11), fair recruitment policy (S12), employee training and development (S13), employee feedback collection (S14), healthcare and health information provision (S15)
2) Occupational health and safety: Safe working environment policy (S21), regular risk assessment (S22), safety training provision (S23), accident and cause recording (S24), industry safety standard adoption (S25)
3) Supply chain management: Supplier sustainability consideration (S31), supplier ESG performance tracking (S32), green procurement policy (S33), supply chain risk identification (S34), regular supplier communication (S35)
4) Customer and product responsibility: Management support for ESG (S41), product environmental factor consideration (S42), honest marketing principles (S43), timely customer complaint handling (S44), clear return and exchange policy (S45)

Governance Dimension (15 indicators) covering:

Board-level ESG oversight, anti-corruption policies, whistleblower mechanisms, fair competition policies, ESG risk management, transparency and disclosure, supply chain governance structures, ESG performance management, supplier ESG accountability, ESG escalation mechanisms, data governance for ESG, ethics training, regulatory compliance, internal audit of ESG, and stakeholder governance.

Each indicator was scored on a scale of zero to one hundred, where zero indicates complete absence of the practice and one hundred indicates full implementation with documented evidence. The overall score for each pillar is computed as the weighted sum of dimension scores, with weights determined by the industry-differentiated weighting mechanism.

3. Assessment Tool and Data Collection

3.1. Assessment Methodology

The assessment employed a structured self-assessment instrument comprising forty indicators organized across the three ESG dimensions. Each case assessment followed a standardized protocol. First, a semi-structured interview was

conducted with a senior representative of the company, typically the founder, chief executive officer, director, or owner-manager. The interviews were conducted between October 2025 and January 2026, either at the company premises or via video conference, and lasted between sixty and ninety minutes each. The interview protocol was organized around five thematic blocks: company background and operational profile, environmental practices and awareness, social policies and stakeholder relations, governance structures and ethical standards, and attitudes towards ESG and sustainability.

The assessment protocol included an introductory meeting explaining objectives and confidentiality arrangements; systematic evidence collection from documentary sources and structured interviews; scoring against predefined rubrics with documented evidence and rationale; and production of a comprehensive profile including pillar and dimension scores, comparative benchmarking, and preliminary improvement recommendations. The standardised protocol was administered by the researcher, who guided enterprise personnel through the assessment process and ensured that the assessment was conducted consistently across enterprises. The researcher also verified the evidence provided by enterprises, requesting additional documentation or clarification where necessary to ensure the accuracy and completeness of the assessment.

3.2. Case Selection

The twelve cases were selected through purposive sampling to maximize variation across industrial sector, company size, and year of establishment. The sample encompasses enterprises in:

1) Public electric vehicle charging infrastructure (C1)
2) Renewable energy (C2)
3) Electronic device assembly and trading (C3)
4) Aquaculture-related trading (C4)
5) Recycled plastic product manufacturing (C5)
6) Cosmetics (C6)
7) Beverage production (C7)
8) Travel agency services (C8)
9) Education (C9)
10) Advertising (C10)
11) Plasticware manufacturing (C11)
12) Professional accounting services (C12)

Company size ranges from 3 to more than 40 employees, and years of establishment span from 1996 to 2024. Notably, all twelve companies confirmed during their respective interviews that they had not previously conducted any formal ESG assessment. The sample was stratified to include representation from manufacturing, construction, services, technology, and other economically significant sectors, and to encompass enterprises at different stages of maturity. The combination of purposive and stratified sampling ensures that the sample is both representative of the broader population of Chinese SMEs and sufficiently diverse to enable the identification of patterns across different contexts.

3.3. Data Collection and Analysis

The researcher independently scored each of the forty indicators using the zero-to-one hundred scale. Each case was assigned a maturity level for each dimension and for the overall assessment, classified as Initial, Basic, Intermediate, or Advanced. A case-specific narrative analysis was prepared, integrating the quantitative scores with the qualitative interview data. To protect confidentiality, all company names and personally identifiable information have been anonymized.

Cross-case analysis employed descriptive techniques to identify patterns across industries and sizes and to examine relationships between performance and organisational characteristics. The use of predefined scoring rubrics with documented evidence and rationale enhanced the transparency and replicability of the assessment process, and provided an audit trail that enabled the verification of individual scoring decisions.

4. Assessment Results of 12 Cases

4.1. Overall Performance

The overall ESG maturity of all twelve enterprises was concentrated at the Initial level, with total scores ranging from 9, achieved by Company C3 (Electronic Device), to 28, achieved by Company C2 (Renewable Energy), out of 120 points, representing achievement rates between 7.5 percent and 23.3 percent.

Table 1. *Comparative Summary of ESG Assessment Results for the Twelve Cases.*

Case	Industry	Manager Position	Size	Est. Year	E (/45)	S (/60)	G (/45)	Total (/120)	Achievement (%)	Maturity Level
C1	Public EV Chargers	Director	30+	2024	10	7	5	22	18.3%	Initial
C2	Renewable Energy	Founder and CEO	30+	2021	14	9	5	28	23.3%	Initial

Case	Industry	Manager Position	Size	Est. Year	E (/45)	S (/60)	G (/45)	Total (/120)	Achievement (%)	Maturity Level
C3	Electronic Device	Owner and Salesman	4	2021	4	3	2	9	7.5%	Initial
C4	Trading (Fish Feed)	Owner and Salesman	5	2016	5	4	3	12	10.0%	Initial
C5	Recycle Plastic Products	Owner and Salesman	5	2023	9	5	4	18	15.0%	Initial
C6	Cosmetic	Founder	15	2017	6	8	5	19	15.8%	Initial
C7	Beverage	Director	40+	2018	8	10	6	24	20.0%	Initial
C8	Travel Agency	Owner and Tour Guide	3	1998	4	4	3	11	9.2%	Initial
C9	Education Centre	CEO	20+	2005	6	10	5	21	17.5%	Initial
C10	Advertising	Owner and Designer	3	2016	4	3	3	10	8.3%	Initial
C11	Plasticware	Owner, Designer, Technician	5	1996	7	5	3	15	12.5%	Initial
C12	Accounting Firm	Director and Accountant	10+	2012	5	7	8	20	16.7%	Initial
Average	All sectors	Various	13.3	2010	6.8	6.3	4.4	17.6	14.7%	Initial

4.2. Dimension-Specific Findings

4.2.1. Environmental Dimension

Scores ranged from 4 to 14 out of 45 (8.9% to 31.1%), with the highest performance in environmentally oriented sectors (C1, C2, C5). However, even these enterprises lacked formal environmental management systems, carbon footprint assessments, and systematic monitoring of key environmental indicators. The universal absence of Scope 3 emissions calculation and third-party verification of carbon data was particularly notable. Companies C1 and C2, operating in environmentally oriented sectors, achieved the highest environmental scores (10 and 14 respectively), but this was often a by-product of their business models rather than deliberate strategy. Company C5, a recycled plastic products manufacturer, maintained basic records of plastic waste volumes processed but lacked formal environmental monitoring and had no wastewater treatment protocol.

4.2.2. Social Dimension

Scores ranged from 3 to 10 out of 60 (5.0% to 16.7%). Enterprises in socially mission-oriented sectors (C9, C6) demonstrated relatively stronger social performance, driven by regulatory requirements and consumer market pressure respectively. Labour and occupational health and safety indicators scored highest, reflecting statutory compliance requirements. However, supply chain management indicators (S31-S35) scored the lowest across all dimensions, with most enterprises lacking supplier sustainability consideration, ESG performance tracking, and green procurement policies. Company C9 (Education Centre) demonstrated the strongest social performance (10/60), maintaining rigorous child protection policies and student safety protocols. Company C7 (Beverage) achieved 10/60 in the social dimension, with formal employment contracts and annual training programmes. Companies C3, C10, and C8 exhibited the lowest social scores (3, 3, and 4 respectively), reflecting the resource constraints of micro-enterprises in trading and service sectors.

4.2.3. Governance Dimension

Scores ranged from 2 to 8 out of 45 (4.4% to 17.8%). The professionally regulated accounting firm (C12) achieved the highest governance score (8/45), reflecting the influence of professional regulatory requirements. Most enterprises lacked formal governance structures, with zero scores for anti-corruption policies, internal ESG risk assessment, and value chain ESG risk assessment. Many enterprises exhibited a pattern of overestimation on governance indicators, conflating general management practices with formal ESG governance structures. Company C12's governance performance was driven by professional regulatory requirements mandating adherence to accounting and auditing standards, professional

ethics codes, and anti-money laundering requirements. The universal absence of formal anti-corruption policies and ESG risk assessment mechanisms was particularly notable across all twelve cases.

Table 2. Dimension Performance Summary.

Dimension	Average Score	Range	Key Finding
Environmental (E)	6.8 / 45	4-14	Highest in environmentally oriented sectors; universal absence of Scope 3 accounting
Social (S)	6.3 / 60	3-10	Strongest in regulatory-driven sectors; supply chain management is critical weakness
Governance (G)	4.4 / 45	2-8	Highest in professionally regulated sector; universal absence of formal ESG governance

4.3. Sectoral Patterns

The assessment revealed distinct sectoral patterns:

1) *Environmentally Oriented Sectors (C1, C2, C5):* Exhibited comparatively stronger environmental performance, often as a by-product of their business models rather than deliberate strategy. C1's core business inherently contributes to emission reduction through EV charging infrastructure. C2's founder demonstrated personal commitment to sustainability, implementing recycling and energy efficiency practices. C5's business model is explicitly premised on environmental value creation through plastic waste diversion. However, internal operations harbored significant environmental and social risks—C5 discharged untreated wastewater from washing processes directly into the municipal sewer, and workers lacked proper respirators for plastic fume protection.
2) *Socially Mission-Oriented Sectors (C9, C6):* Demonstrated relatively stronger social performance, driven by regulatory requirements (education sector) and consumer market pressure (cosmetics sector). C9 maintained rigorous child protection policies and student safety protocols. C6 obtained cruelty-free certification and used recyclable packaging for premium products in response to consumer demand. However, both lacked formal environmental management systems and comprehensive governance structures.
3) *Professionally Regulated Sectors (C12):* Exhibited the strongest governance performance (17.8%), reflecting the influence of professional regulatory requirements including accounting and auditing standards, professional ethics codes, and anti-money laundering requirements. However, environmental and social dimensions remained underdeveloped.
4) *Trading and Service Sectors (C4, C8, C10):* Showed the lowest overall scores, with significant indirect environmental and social impacts through supply chain relationships that remained entirely unmanaged. C8's travel agency had substantial indirect impact through transportation emissions and visitor pressure on heritage sites, yet no low-carbon itinerary design or eco-certified partner selection. C10's advertising agency had minimal direct footprint but significant indirect influence through creative content promoting consumption patterns.
5) *Traditional Manufacturing (C11):* Long-established enterprises with experienced owner-managers faced particular barriers to ESG adoption due to established operational routines and limited exposure to sustainability concepts. Despite 30 years of operation, the company's environmental management had not been a consideration, and the owner attributed the absence of serious accidents to worker experience rather than formal safety management.

4.4. Company Size and Age Effects

Company size emerged as a positive correlate of ESG maturity, with larger enterprises (C1, C2, C7, C9) generally achieving higher scores than micro-enterprises (C3, C4, C8, C10). This reflects greater managerial capacity, more formalized operational systems, and enhanced resource availability. Larger enterprises demonstrated more structured employment practices, formal training programmes, and documented procedures. However, company age was not a reliable predictor, as the oldest enterprises (C8, established 1998; C11, established 1996) did not outperform younger peers, suggesting that long-established owner-managers with traditional industry backgrounds may face particular barriers to ESG adoption due to established operational routines and limited exposure to sustainability concepts.

4.5. The Awareness-Without-Action Phenomenon

A consistent finding across all twelve cases was the "awareness-without-action" phenomenon. Senior managers were aware of ESG concepts to varying degrees but had not translated this awareness into formal management systems. The primary reasons included:

1) *Absence of regulatory mandates:* Most managers explicitly stated that ESG was not a priority because it was not legally required. The catering sector CEO in the pilot study acknowledged ESG importance but had not implemented any initiatives due to the absence of compulsory requirements.
2) *Cost concerns:* Managers perceived ESG implementation as increasing costs without commensurate benefits. The catering CEO explicitly stated the company would not spend additional resources on environmental protection beyond utility cost management.
3) *Resource constraints:* Limited personnel, time, and financial resources prevented systematic ESG engagement. Micro-enterprises with 3-5 employees had no capacity for ESG management beyond basic compliance.
4) *Cognitive conflation of compliance with ESG:* Several managers equated existing regulatory compliance with ESG implementation, creating a false sense of sufficiency.

The interview data consistently revealed that managers prioritized immediate operational and financial concerns over long-term sustainability. Company C1's director acknowledged high turnover among field technicians but had not implemented formal training or career progression pathways. Company C5's owner acknowledged that electricity was the company's second-largest operating cost but had not analysed consumption patterns or implemented efficiency measures beyond basic practices.

5. Discussions

5.1. The Policy-Performance Gap

The most significant finding of this assessment is the universal gap between policy and performance. Several enterprises had implemented environmental measures including energy efficiency improvements, waste recycling, and water conservation, but these were motivated primarily by cost reduction rather than environmental commitment. This finding is consistent with the pilot study finding in which the catering case company's CEO acknowledged concern about energy and water consumption solely because of their impact on operating expenditure. The prevalence of cost-driven practices suggests that ESG promotion strategies for Chinese SMEs should emphasize the business case for sustainability, including cost savings, risk mitigation, and market access, rather than relying on normative arguments regarding environmental responsibility.

5.2. Supply Chain Management as the Critical Weakness

Supply chain management indicators (S31-S35) received the lowest average scores across all dimensions and all twelve cases. Most enterprises had no formal supplier sustainability consideration, no ESG performance tracking, and no green procurement policies. Companies C1 and C2, despite operating in environmentally oriented sectors, scored zero on supply chain sustainability indicators. This finding is particularly significant because SMEs in China are deeply integrated into global and domestic supply chains, and their ability to demonstrate ESG compliance is increasingly a prerequisite for supply chain participation. The absence of supply chain ESG management represents both a significant risk and a missed opportunity for improvement. As large enterprises cascade their own ESG commitments down through supply chains, SMEs that cannot demonstrate basic ESG performance risk being locked out of the most lucrative contracts.

5.3. The Role of Business Model and Sector

The assessment reveals that business model and sector characteristics significantly influence ESG performance profiles. Enterprises in environmentally oriented sectors achieved higher environmental scores, while those in socially mission-oriented sectors achieved higher social scores. This suggests that ESG performance is often a by-product of core business activities rather than deliberate strategy. The implication is that SME ESG frameworks must be sector-specific to capture the material issues relevant to each industry and to avoid burdening enterprises with indicators that are not relevant to their operations. For example, service-sector enterprises (C8, C10) may have minimal direct environmental footprint but significant indirect impact through supply chain relationships and service output, requiring different assessment priorities than manufacturing enterprises.

5.4. The Importance of Regulatory and Market Drivers

The cases reveal that regulatory requirements and market pressure are powerful drivers of ESG adoption. The education centre (C9) demonstrated strong social performance driven by regulatory requirements for child protection and student safety. The cosmetics company (C6) adopted certain environmental practices in response to consumer demand for cruelty-free and environmentally friendly products. The accounting firm (C12) exhibited strong governance performance driven by professional regulatory requirements. Conversely, enterprises operating in sectors without strong regulatory or market pressure exhibited the lowest overall scores. Company C8 (Travel Agency) and C10 (Advertising) showed the lowest scores among service-sector enterprises, reflecting the absence of sector-specific ESG pressure. This finding suggests that accelerating ESG adoption among SMEs will require both regulatory interventions and market-based incentives.

5.5. Implications for Framework Refinement

Several limitations of the current framework emerged from

the assessment. First, the framework's indicator set, while comprehensive, does not include industry-specific indicators that would capture the unique ESG risks and opportunities of particular sectors. For service-sector enterprises, the most significant ESG impacts may reside in the content and services produced rather than in internal operations. Second, the framework's supply chain indicators assume a certain level of supply chain visibility and control that may not be realistic for all SMEs, particularly micro-enterprises with limited procurement leverage. Third, the reliance on a single senior informant per company introduced the risk of response bias and incomplete information regarding frontline operational practices. Fourth, the framework's current design does not include a mechanism for contextualising scores according to industry, size, or geographic location, which means that raw scores can be misleading when compared across enterprises with fundamentally different operational characteristics.

6. Conclusions and Future Research

6.1. Summary of Findings

The assessment of twelve SMEs yields several significant findings:

1) *Uniformly Low ESG Maturity:* All twelve enterprises were concentrated at the Initial maturity level, with total scores ranging from 9 to 28 out of 120 (7.5% to 23.3%). This confirms that Chinese SMEs have not systematically developed ESG management capabilities.
2) *The Awareness-Without-Action Gap:* Senior managers were aware of ESG concepts but had not translated this awareness into formal management systems, primarily due to the absence of regulatory mandates, cost concerns, and resource constraints.
3) *Sectoral Patterns:* Enterprises in environmentally oriented, socially mission-oriented, and professionally regulated sectors exhibited relatively stronger performance in their respective dimensions, suggesting that ESG performance is often a by-product of core business activities.
4) *Supply Chain Management as Critical Weakness:* Supply chain indicators received the lowest scores across all dimensions, indicating that SMEs have limited visibility into and influence over the ESG practices of their suppliers.
5) *Cost-Driven Environmental Practices:* Environmental measures were primarily motivated by cost reduction rather than environmental commitment, suggesting that ESG promotion strategies should emphasize the business case for sustainability.
6) *Company Size as Correlate:* Larger enterprises generally achieved higher scores than micro-enterprises, reflecting greater managerial capacity and resource availability. Company age was not a reliable predictor of ESG performance.

6.2. Implications for Policy and Practice

1) *Sector-Specific ESG Frameworks:* ESG assessment tools for SMEs must be sector-specific to capture material issues and avoid burdening enterprises with non-relevant indicators.
2) *Emphasis on Business Case:* Promotion strategies should emphasize the immediate financial benefits of basic ESG practices—energy cost savings, waste reduction, improved employee retention, and reduced insurance costs.
3) *Regulatory and Market Drivers:* Accelerating ESG adoption among SMEs will require both regulatory interventions and market-based incentives.
4) *Supply Chain Support:* Large buyers should provide technical assistance and capacity building to SME suppliers rather than imposing punitive requirements.
5) *Accessible Assessment Tools:* SME-appropriate assessment tools must be simplified, cost-effective, and designed for users with limited ESG expertise.
6) *Distinction Between Compliance and ESG:* Educational interventions should explicitly articulate how ESG extends beyond minimum legal requirements and help SME owners identify gaps between current compliance practices and comprehensive ESG performance.

6.3. The Necessity for Stage II Assessment

The Stage I findings establish the necessity for Stage II assessment. Stage I has demonstrated that the framework can generate a reliable baseline assessment across diverse SMEs and can identify broad patterns of strength and weakness. However, the uniformly low performance across all twelve cases means that the framework's capacity to differentiate between Intermediate and Advanced levels remains untested. Furthermore, the contextual limitations identified during Stage I, particularly regarding indirect impacts, supply chain responsibility, and the depth of underlying practices, require a more intensive, multi-source, and context-sensitive assessment approach.

Stage II will select a small number of cases for in-depth assessment, employing multiple data sources, on-site observation, document review, and stakeholder consultation to validate and elaborate upon the Stage I findings. The transition from Stage I to Stage II represents a shift from breadth-oriented screening to depth-oriented validation, ensuring that the framework is both widely applicable and meaningfully diagnostic. This two-stage design addresses a key barrier to ESG assessment among SMEs, namely the perception that ESG assessment is too resource intensive and complex for small organisations to undertake.

Abbreviations

CEO	Chief Executive Officer
CSRD	Corporate Sustainability Reporting Directive
ESG	Environmental, Social, and Governance

EV	Electric Vehicle
GDP	Gross Domestic Product
GRI	Global Reporting Initiative
SASB	Sustainability Accounting Standards Board
SMEs	Small and Medium-sized Enterprises
USD	United States Dollar

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Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Akilah, F. (2024). ESG implementation in business: Managing the sustainability goals in micro, small, and medium enterprises (MSMEs). Sukuk: International Journal of Banking, Finance, Management and Business, 3(1), 1–15.

[2] Alvarez Jaramillo, J. D., et al. (2019). Sustainability assessment systems for small and medium-sized enterprises: A systematic review. Sustainability, 11(19), 5244.

[3] Amacher, G. S., Koskela, E., & Ollikainen, M. (2004). Environmental quality competition and eco-labeling. Journal of Environmental Economics and Management, 47(2), 284–306.

[4] Andrey, E. (2023). ESG as an innovative tool to improve the efficiency and financial stability of financial organizations. Procedia Computer Science, 221, 705–709.

[5] Bhandari, A., & Javakhadze, D. (2017). Corporate social responsibility and capital allocation efficiency. Journal of Corporate Finance, 43, 354–377. https://doi.org/10.1016/j.jcorpfin.2017.01.012

[6] Buboi, A. (2025). Determinants of ESG Reporting Difficulty in the Absence of Global Standardization. Acta Universitatis Danubius. Economica, 21(3), 59–82.

[7] Cai, C., et al. (2024). Cost analysis of ESG reporting implementation for small and medium-sized enterprises.

[8] Chen, Y. H., Wang, C., Nie, P. Y., & Chen, Z. R. (2020). Carbon tax, cap-and-trade and their implications for enterprise environmental strategy. Energy Policy, 147, 111864.

[9] Cui, Y., Geobey, S., Weber, O., & Lin, H. (2018). The impact of green lending on credit risk in China. Sustainability, 10(6), 2008. https://doi.org/10.3390/su10062008

[10] Dai, L., & Wang, J. (2024). The impact of ESG rating disagreement on corporate risk-taking: Evidence from China. Digital Economy and Sustainable Development, 2(1), 18. https://doi.org/10.1007/s44265-024-00041-6

[11] Dathe, T., Helmold, M., Dathe, R., & Dathe, I. (2024). ESG reporting rules. In Implementing environmental, social and governance (ESG) principles for sustainable businesses (pp. 147–158). Springer.

[12] De Souza Barbosa, A., da Silva, M. C. B. C., da Silva, L. B., Morioka, S. N., & de Souza, V. F. (2023). Integration of Environmental, Social, and Governance (ESG) criteria: their impacts on corporate sustainability performance. Humanities and Social Sciences Communications, 10(1), 1–18.

[13] Deepak, D., Reshma, S., Vennila, R., & Sudha, B. (2024). A Systematic Review of Sustainability Assessment Instruments: Examining the Sustainability Accounting Standards Board (SASB) and the Global Reporting Initiative (GRI). NIFM Journal of Public Financial Management, Special Issue, 33–41.

[14] Dossa, J. V. (2025). Can Sustainability Pay Off? Evaluating ESG Disclosure and Financial Outcomes in Chinese's Health Care Firms. Business Strategy & Development, 8(1), e70061.

[15] Elkins, P., & Baker, T. (2001). Carbon taxes and carbon emissions trading. Journal of Economic Surveys, 15(3), 325–376. https://doi.org/10.1111/1467-6419.00142

[16] Grewal, J., & Serafeim, G. (2020). Research on corporate sustainability: Review and directions for future research. Foundations and Trends® in Accounting, 14(2), 73–127.

[17] Hartlieb, S., & Eierle, B. (2024). Do auditors respond to clients' climate change-related external risks? Evidence from audit fees. European Accounting Review, 33(3), 1075–1103.

[18] Yip, A. W., Yu, W. Y., & Ip, Q. W. (2024). Financial penalties for ESG non-compliance: Evidence from Chinese carbon-intensive sectors.

[19] Huaide, L., & Jingrong, W. (2011). Industrial emissions and environmental regulation in Chinese manufacturing SMEs.

[20] Jamali, M. A., & Voghouei, H. (2025). Sustainable finance and sustainable development goals: A comparative review of tools, gaps, and governance challenges. Sustainable Development. [Advance online publication]

[21] Kong, D., & Majhi, M. (2025). Integrating Social Responsibility into Business Strategy: a Roadmap for Sustainable Development. Journal of Lifestyle and SDGs Review, 5(5), e06596.

[22] Krueger, P., Sautner, Z., Tang, D. Y., & Zhong, R. (2024). The effects of mandatory ESG disclosure around the world. Journal of Accounting Research, 62(5), 1795–1847.

[23] Lateefat, T., & Bankole, F. A. (2021). Capital allocation strategies in asset management firms to maximize efficiency and support growth objectives. International Journal of Multidisciplinary Research and Growth Evaluation, 2(2), 478–495.

[24] Layzer, J. A., & Rinfret, S. R. (2019). The environmental case: Translating values into policy. CQ Press.

[25] Li, J., Pan, Z., Sun, Y., Zheng, W., Zhang, Z., & Wang, Z. (2024). From compliance to strategy: paradigm shift in corporate ESG practices. Academic Journal of Humanities & Social Sciences, 7(2), 185–193.

[26] Liu, X. (2007). SME development in China: A policy perspective on SME industrial clustering (ERIA Research Project Report No. 5, pp. 37–68). Economic Research Institute for ASEAN and East Asia.

[27] McKinsey & Company, & NielsenIQ. (2023). Consumers care about sustainability—and back it up with their wallets.

[28] Meng, B., Liu, Y., Andrew, R., Zhou, M., Hubacek, K., Xue, J., ... & Gao, Y. (2018). More than half of China's CO2 emissions are from micro, small and medium-sized enterprises. Applied Energy, 230, 712–725.

[29] Mishra, S. P., Kumar, R., & Rout, J. (2023). An overview of green, social, sustainability, and sustainability-linked (GSSS) bonds. Journal of Social and Economic Development, 25(Suppl 1), 127–145.

[30] Mitra, J., & Bui, H. T. (2024). ESG and SMEs: The State of Play. International Network for SMEs (INSME).

[31] Momtaz, P. P., & Parra, I. M. (2025). Is sustainable entrepreneurship profitable? ESG disclosure and the financial performance of SMEs. Small Business Economics, 64(4), 1535–1564.

[32] Murphy, L. (2023). Supply chain ESG mandates and their impact on SME subcontractors.

[33] Pizzi, S., Principale, S., & De Nuccio, E. (2023). Material sustainability information and reporting standards. Exploring the differences between GRI and SASB. Meditari Accountancy Research, 31(6), 1654–1674.

[34] Schoenmaker, D. (2021). Greening monetary policy. Climate Policy, 21(4), 581–592.

[35] Sciarelli, M., Cosimato, S., Landi, G., & Iandolo, F. (2021). Socially responsible investment strategies for the transition towards sustainable development: The importance of integrating and communicating ESG. The TQM Journal, 33(7), 39–56. https://doi.org/10.1108/TQM-08-2020-0180

[36] Shari, W., Hassan, M. H. A., Ezanee, A. A. M., Wahab, N. M. A., & Abd Wahab, N. (2024). Ways to promote sustainable practices among Malaysian SMEs from the viewpoints of experts. Journal of Asian Scientific Research, 14(4), 597–611.

[37] Sheehan, N. T., Vaidyanathan, G., Fox, K. A., & Klassen, M. (2023). Making the invisible, visible: Overcoming barriers to ESG performance with an ESG mindset. Business Horizons, 66(2), 265–276. https://doi.org/10.1016/j.bushor.2022.07.003

[38] Stavins, R. N. (2008). Addressing climate change with a comprehensive US cap-and-trade system. Oxford Review of Economic Policy, 24(2), 298–321. https://doi.org/10.1093/oxrep/grn017

[39] Sump, F., & Yi, S. (2021). Different reasons for different responses: A review of incumbents' adaptation in carbon-intensive industries. Organization & Environment, 34(2), 323–346.

[40] Wielechowski, M., & Krasuski, P. (2024). ESG concepts in business practice: Characteristics and assessment of common ESG frameworks. MAZOWSZE Studia Regionalne, (Special Edition 2024), 9–26.

[41] Wong, W. K., Teh, B. H., & Hooi, T. S. (2023). Evolving stakeholder demands and ESG expectations for SMEs.

[42] Yan, F., Chen, L., & Jia, F. (2025). Supply chain ESG expectations and SME compliance strategies.