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Small and Medium-Sized Enterprises in the Green Transition: Survival and Sustainability Challenges in ESG Practices

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Abstract: Against the backdrop of global green development and China's dual carbon goals, ESG has emerged as a key metric for assessing corporate sustainability. SMEs, as vital constituents of the national economy, play a significant role in the green transition. However, constrained by factors such as capital and technology, they face multiple challenges in ESG implementation: difficulties in cost accounting and insufficient technological innovation within the environmental dimension; weak sense of responsibility and inadequate protection of employee rights within the social dimension; structural deficiencies and weak information disclosure within the governance dimension. Furthermore, they encounter difficulties in cross-dimensional integration and coordination. In response, this study proposes strategic optimisation pathways for enterprises, including value reconstruction, lightweight digitalisation, and collaborative innovation. These aim to assist SMEs in balancing survival with sustainable development while simultaneously contributing to carbon reduction across supply chains and the green transformation of economic systems.

Keywords: SMEs; ESG practices; green transition; sustainability challenges

1. Introduction

Green development is increasingly becoming a core issue in global economic and social transformation. Globally, climate change, resource depletion, and environmental degradation pose threats to human survival and sustainable social development. China's introduction of the "dual carbon" goals within this process represents an inevitable choice for driving high-quality economic development. Green transition requires enterprises across

sectors to integrate sustainable principles into production, operations, and governance. Environmental, Social, and Governance (ESG) metrics, serving as indicators of comprehensive corporate sustainability, have progressively become focal points for capital markets and regulatory bodies.

Small and medium-sized enterprises (SMEs) hold particular significance within China's national economy. Comprising over 90% of all enterprises, they absorb substantial employment across manufacturing, services, and high-tech sectors. In the green transition, SMEs serve as vital participants in the supply side while also driving green consumption and the circular economy. However, compared to large corporations, SMEs face inherent disadvantages in capital, technology, management, and talent, encountering significant hurdles in establishing and implementing ESG frameworks. Examining the survival and sustainability challenges of SME ESG practices within the green transition context not only aids in understanding policy-driven impacts on enterprises but also sheds light on the role of corporate strategic choices in sustainable development.

Existing research indicates that implementing ESG within institutionally complex environments requires balancing the demands of diverse stakeholder groups [1]. Government and regulatory bodies are progressively strengthening green policies, while public expectations regarding corporate environmental responsibility continue to rise. Financial markets are also increasingly prioritising enterprises' ESG performance. Under survival pressures, SMEs tend to focus more on short-term economic benefits and lack the financial and institutional conditions to implement ESG, creating tension between policy objectives and corporate realities. Striking a balance between compliance, responsibility, and development has become an unavoidable major challenge for SMEs.

This study examines SMEs' ESG practices within the green transition framework through dual lenses: policy orientation and corporate strategy. First, it systematically reviews ESG principles and the green transition policy context, synthesising domestic and international research findings. Secondly, it delves into the challenges SMEs encounter in ESG implementation, highlighting constraints such as costs, compliance, financing, and disclosure requirements. Subsequently, it proposes response pathways from both policy orientation and corporate strategy perspectives, aiming to theoretically elucidate the interactive logic between government and enterprises while offering practical, actionable optimisation recommendations.

2. Theoretical Foundations and Literature Review

2.1. ESG Principles and Theoretical Foundations

The ESG concept originated from the 2004 initiative of the United Nations Global Compact, centred on evaluating corporate performance across environmental protection, social responsibility, and governance structures. Unlike traditional financial metrics, ESG emphasises enterprises' capacity for long-term value creation beyond financial dimensions. Wang Tao et al. (2025) contend that when implementing ESG practices within complex institutional environments, enterprises must navigate not only external pressures from regulators and markets but also resolve internal conflicts between economic interests and

social responsibilities [1]. This indicates that ESG has evolved beyond mere corporate image enhancement to become a comprehensive institutional arrangement embedded within corporate strategy and governance systems.

Theoretically, institutional theory, stakeholder theory, and resource-based theory are frequently employed to explain corporate ESG behaviour. Institutional theory emphasises the regulatory influence of external institutional environments, requiring firms to secure legitimacy through compliance and disclosure. Stakeholder theory posits that while pursuing profits, enterprises must also balance the interests of employees, customers, communities, and the environment. Resource-based theory, adopting an internal perspective, argues that enterprises can develop differentiated competitive advantages through the accumulation and integration of resources. Collectively, these three theories reveal the internal and external drivers of corporate ESG practices.

2.2. The Policy Environment for Green Transition

Green transition represents a strategic choice for advancing sustainable economic and social development. Since the 13th Five-Year Plan period, China has progressively strengthened green development policies, proposing the establishment of a green, low-carbon, and circular economic system. In recent years, the state has issued a series of ESG-related policy documents, including the Measures for the Disclosure of Enterprise Environmental Information in Accordance with the Law, the Green Finance Guidance Opinions, and the Opinions on Accelerating the Comprehensive Green Transformation of Economic and Social Development. These policies require enterprises to reduce carbon emissions in production and operations, promote green supply chain development, enhance environmental information disclosure, and encourage financial institutions to incorporate ESG performance into investment and financing decisions.

Green finance provides crucial support for corporate transformation, particularly for small and medium-sized enterprises (SMEs). Its development enables banks to use indicators such as the ecological impact of corporate activities and carbon emission intensity as direct credit signals, thereby streamlining financing processes and reducing costs. This enhances the external financing scale for green enterprises operating under conditions of information asymmetry (Wang Jieyu et al., 2024) [4]. In this process, green finance not only alleviates SMEs' financing difficulties but also provides them with policy endorsement.

2.3. Current State of Domestic and International Research

Scholars globally have deepened research into the relationship between ESG and green transition. Internationally, Western nations established comprehensive ESG evaluation systems early on, integrating them closely with investment decisions. Domestic scholars, however, focus more on ESG's role within national strategies and policy guidance. Zhang Qibin et al. (2025) highlight prominent issues in SME ESG disclosure, including resource constraints, incomplete data, and a lack of standardisation [2]. Wang Jun and Wang Jie (2025) observed that the integrated development of the digital economy and traditional industries facilitates improvements in product and service quality alongside the reshaping of

competitive advantages. To tangibly advance the upgrading and transformation of traditional industries, Made in China 2025 positions digitalisation as a crucial "lever" for manufacturing enterprises to achieve high-quality development, thereby enhancing product value-added and reversing the unfavourable position of traditional manufacturing within international value chains [3].

The report of the 20th CPC National Congress states: "Coordinate industrial restructuring, pollution control, ecological conservation and climate change response; synergistically advance carbon reduction, pollution control, ecological expansion and economic growth; promote ecological priority, resource conservation, intensive development and green, low-carbon development." Environmental governance and protection throughout economic development remain critical concerns. Only by organically integrating economic and environmental benefits can high-quality economic development be better achieved [5].

3. Challenges Faced by SMEs in ESG Implementation

3.1. Within the environmental dimension, SMEs encounter multifaceted challenges.

Environmental costs encompass environmental governance expenses, environmental damage costs, and environmental opportunity costs. However, constrained by insufficient expertise in environmental accounting knowledge and methodologies, enterprises struggle to accurately calculate and effectively manage these associated costs. Regarding carbon emissions, some SMEs lack carbon accounting capabilities and monitoring equipment, leading to inaccurate data and consequently undermining the scientific rigour of emissions reduction decisions. Resource utilisation frequently suffers from waste and increased costs due to inadequate measurement and management systems, intensifying economic pressures during green transitions. Concurrently, insufficient green technological innovation capacity constitutes another bottleneck constraining SME development. Insufficient R&D investment, talent shortages, information asymmetry, and elevated risks place SMEs at a disadvantage in green technology development and application, hindering sustained innovation momentum.

SMEs also exhibit significant shortcomings in environmental risk management and green supply chain development. Environmental risks span multiple dimensions including compliance, reputation, and operations. However, SMEs generally lack robust risk identification and response mechanisms, with weak risk assessment and emergency capabilities, rendering them ill-equipped to effectively manage sudden environmental incidents. Within supply chains, SMEs lack the capacity to evaluate and control suppliers' environmental performance. They are subject to external pressure from core enterprises' compliance requirements while lacking the necessary resources and technical support to undertake green transformation. Concurrently, cost and technical barriers in areas such as green packaging and green logistics place enterprises in a passive position regarding overall green supply chain management.

On the social front, SMEs encounter multiple challenges in fulfilling their social responsibilities. Overall awareness of social responsibility remains insufficient. Some managers narrowly interpret responsibility as charitable donations or public relations

activities, overlooking its critical link to long-term business development. Even where awareness exists, limited resources often hinder comprehensive implementation. Regarding employee rights, SMEs commonly exhibit low remuneration and welfare levels, inadequate occupational health and safety safeguards, limited training and development opportunities, and flawed communication and feedback mechanisms. This leads to low employee satisfaction and loyalty, constraining sustainable development. Regarding community relations, SMEs often struggle with inadequate communication channels, making it difficult to promptly grasp community needs. Limited resources hinder active participation in community development, while insufficient risk management capabilities can easily provoke conflicts and disputes. In product responsibility and consumer rights, some SMEs suffer from imperfect quality control systems, insufficient information disclosure, and inadequate complaint handling mechanisms. This not only damages consumer trust but may also lead to legal and reputational risks. Collectively, these issues reflect the shortcomings and dilemmas SMEs face in their social responsibility practices.

3.2. Governance-level challenges

SMEs commonly exhibit inadequate governance structures and a disconnect between ESG strategies and operational practices. Many enterprises exhibit excessive equity concentration and pronounced family ownership characteristics, lacking effective checks and balances. Governance bodies such as boards of directors and supervisors are often underdeveloped, with decision-making frequently characterised by autocratic tendencies, insufficient transparency, and a lack of scientific rigour. This predisposes them to insider control and improper benefit transfers. Regarding ESG governance, numerous enterprises lack clear strategic positioning and systematic management frameworks, failing to integrate ESG principles into governance and decision-making processes. The absence of dedicated management departments and defined responsibilities results in superficial ESG implementation. Disclosure mechanisms remain similarly weak. Some enterprises harbour concerns that disclosing sensitive information may pose risks, resulting in insufficient willingness to disclose. Concurrently, the absence of disclosure standards and guidelines tailored to SMEs, coupled with a lack of professional talent and information system support, often leads to incomplete or inaccurate disclosures. This fails to meet the needs of external stakeholders, creating information asymmetry. Concurrently, the shortage of ESG specialists further constrains corporate governance capabilities. Limited remuneration and career progression opportunities place SMEs at a competitive disadvantage in talent acquisition, while inadequate internal training mechanisms result in insufficient professional support for strategic formulation, risk management, and disclosure processes.

3.3. Challenges in Cross-Dimensional Integration and Synergy

Beyond the distinct challenges within each environmental, social, and governance dimension, SMEs also grapple with the difficulty of cross-dimensional integration and coordination. While ESG dimensions should mutually reinforce one another, constrained by limited resources and insufficient expertise, SMEs often struggle to achieve systematic

planning and coordination. This results in disconnected environmental, social, and governance objectives, imbalanced resource allocation, and inadequate performance evaluation systems, leading to insufficient synergistic effects. ESG practices also exhibit low integration with core business operations. Corporate culture and values provide insufficient support for sustainability principles, while business processes and management systems lack alignment. Performance assessments and incentive mechanisms fail to embed ESG effectively, causing disconnects between ESG initiatives and daily operations and increasing costs and complexity. More significantly, ESG strategies often fail to align with long-term corporate objectives. SMEs, under pressure to survive in the short term, prioritise financial performance over sustainable development. Limited strategic planning capabilities hinder the translation of ESG principles into concrete targets and actions. Frequent market fluctuations further necessitate short-term strategic adjustments, undermining the continuity and long-term value of ESG initiatives.

4. Optimisation Pathways at the Strategic Level

4.1. Transforming Value from "Passive Compliance" to "Proactive Integration"

SMEs must overcome the perception that ESG entails additional costs, deeply integrating ESG objectives with operational contexts rather than treating them as mere top-level planning. In corporate culture development, one should abandon one-way communication in favour of contextualised permeation and full staff engagement. Management should undergo decision-making training based on industry non-compliance and shutdown case studies, linking ESG directly to corporate survival. For frontline staff, design participatory green practice projects to embed eco-friendly behaviours as routine norms. Implement incentive mechanisms such as environmental suggestion boxes to encourage micro-innovations in areas like packaging reduction and wastewater recycling, thereby lowering transformation costs and enhancing employee buy-in.

4.2. Digitalisation and Information Infrastructure: A Low-Cost, Adaptable "Lightweight" Implementation Pathway

SMEs should avoid pursuing high-investment digital systems indiscriminately. Instead, they should select information tools adhering to the principle of "budget-appropriate, demand-driven" selection, achieving ESG management efficiency gains through a lightweight model. For carbon accounting, standardised calculation tools developed by third parties can be utilised. By inputting basic data such as production factor consumption and energy usage, these tools automatically generate carbon emission reports compliant with regional regulatory requirements, simplifying the accounting process and reducing data processing costs and disclosure complexity.

For constructing information disclosure systems, a tiered and automated operational mechanism is essential. Internally, fragmented ESG data from production, finance, and administrative departments should be consolidated into unified data ledgers. Data

classification and intelligent aggregation tools enable cross-departmental collaborative management, providing data-driven support for internal ESG decision-making. Externally, integration with ESG information-sharing platforms for SMEs established by local governments or industry organisations is required. Interface adaptation enables automatic synchronisation of core data, reducing duplicate reporting efforts while enhancing the timeliness and transparency of disclosures. This lays the data foundation for green financing and policy support applications.

4.3. Collaborative Innovation and Resource Integration: Leveraging External Support to Overcome Resource Constraints

Addressing limitations in technological capabilities and financial resources, SMEs must leverage multi-faceted collaborative mechanisms to effectively integrate external resources, transforming external support into driving momentum for ESG implementation. Within the industrial chain, SMEs should proactively align with the green supply chain systems of anchor enterprises. By leveraging these firms' technical standards, testing resources, and management expertise, SMEs can lower the technical barriers and equipment investment costs associated with their own ESG initiatives. Simultaneously, they should negotiate cost-sharing mechanisms with upstream and downstream partners. Designing benefit distribution and cost-sharing schemes around environmental material procurement and green production technology adoption alleviates financial pressures during transition, fostering ESG synergies across the industrial chain.

From an industry collaboration perspective, regional SMEs of similar types may form green innovation alliances to pool resources for common environmental needs. This enables economies of scale to reduce fixed costs and enhance resource efficiency. From an industry-academia-research collaboration perspective, prioritise the principles of "practical orientation and scenario adaptation" by establishing targeted R&D partnerships with local universities and research institutes. Focus on resolving specific ESG pain points within production processes, avoiding the pursuit of cutting-edge technologies at the expense of implementation feasibility. Ensure R&D outcomes can be rapidly translated into tangible production benefits, thereby enhancing the technological underpinnings for ESG implementation.

4.4. Governance Structure and Organisational Innovation: Flexible Design Tailored to SME Scale

SMEs need not replicate the ESG governance frameworks of large corporations. Instead, they should establish "streamlined, efficient, and clearly accountable" organisational models tailored to their scale. Position design may adopt a "part-time, coordinating" approach, creating an ESG specialist role filled by existing staff with financial, production, or administrative backgrounds. This individual would coordinate ESG activities across departments, including data collection, target advancement, and issue feedback. Simultaneously, develop departmental ESG responsibility matrices to clarify specific duties within environmental governance and social responsibility fulfilment for production,

procurement, human resources, and other departments. This prevents execution delays caused by dispersed accountability and ensures ESG initiatives have clear organisational champions.

4.5. Brand and Market Strategy: Overcoming Competitive Challenges Through Differentiated Advantages

SMEs must translate ESG practices into differentiated competitive advantages, enhancing market recognition through green brand building and optimised market strategies. When selecting green certifications, adhere to the principle of "aligning with target markets and prioritising access standards". For domestic markets, focus on green certification systems that meet local consumer demands and policy requirements, strengthening the environmental credentials of products within China. For international markets, align with target regions' environmental access standards to obtain certifications meeting market entry requirements, thereby avoiding missed opportunities due to certification gaps. Precise certification selection builds market access barriers and trust foundations for products.

To enhance market influence, SMEs may participate in ESG standard-setting through industry collaboration mechanisms. Leveraging the platform advantages of local industry associations, they should unite with peer enterprises to articulate collective demands. Proposals for standard revisions addressing common challenges in SME ESG implementation should be advanced to foster an ESG evaluation framework tailored to SME characteristics, thereby preventing exclusion from standards dominated by large corporations. Concurrently, SMEs may utilise government-organised green development platforms to disseminate methodologies and value propositions of their ESG practices, thereby amplifying their professional influence within the sector.

5. Conclusions and Policy Recommendations

Green transition creates differentiated market opportunities and policy support dividends for SMEs. Opportunities in emerging niche sectors driven by expanding green consumption demand, alongside supporting roles within green industrial chain collaborations, assist them in overcoming traditional homogenous competition bottlenecks and integrating into higher-tier industrial ecosystems. Simultaneously, they face a chain of constraints encompassing "costs – financing – compliance – technology": initial investments in environmental equipment procurement and ESG system establishment conflict with SMEs' "short-cycle, asset-light" operational models, creating significant cost pressures. Inadequate ESG data disclosure elevates financial institutions' lending thresholds, resulting in insufficient transition funding. Weak management capabilities and talent shortages exacerbate compliance risks, while insufficient technological reserves constrain the upgrade from "basic compliance" to "value creation." These four factors mutually reinforce each other, forming core obstacles.

In green finance, guide financial institutions to develop ESG risk models tailored to SMEs, incorporating long-term emission reduction potential and market competitiveness enhancement into assessments rather than relying solely on financial metrics. In environmental disclosure, simplify standards by focusing on core data such as energy

consumption and emissions, providing standardised reporting templates to reduce compliance costs. Governments should establish dedicated funds to support SMEs' green technology R&D and environmental equipment upgrades. Public service platforms should integrate policy advisory and third-party testing resources. Financial institutions should innovate ESG credit loans and green supply chain finance products, partnering with governments to establish risk compensation funds that lower financing barriers. Research institutions should address SMEs' production bottlenecks by developing low-cost, practical technologies, facilitating implementation through technical training and joint R&D to overcome technical constraints.

Strategic planning should prioritise initiatives based on business attributes: manufacturing firms should concentrate on energy consumption control in production processes, while service enterprises should emphasise green service workflows. ESG objectives should be broken down into annual plans and departmental metrics, subject to dynamic adjustment. Capacity enhancement should leverage lightweight digital systems to integrate production and financial data, enabling real-time energy consumption monitoring and automated generation of disclosure reports to improve management efficiency. Address resource constraints by joining green supply chain collaboration frameworks and industry alliances to share technical expertise and distribute environmental compliance costs. Governance-wise, establish streamlined structures with part-time ESG officers coordinating efforts, integrating ESG metrics into performance evaluations and linking them to remuneration and promotions. Brand-wise, enhance market recognition through targeted green certifications, creating a virtuous cycle of "ESG performance – brand value – market share".

Policies provide a stable environment through institutional design, resolving the dilemma of "wanting to transform but being unable to move forward"; enterprises then convert policy dividends into intrinsic capabilities through strategic adjustments, such as investing fund capital in technological R&D and leveraging digital tools to enhance ESG management, thereby achieving "the ability to transform and transform well". In the short term, policy support helps enterprises sustain operations and initiate transformation. Long-term, their ESG advantages translate into market competitiveness, such as securing priority government procurement contracts and attracting green investment. This virtuous cycle not only unifies SMEs' survival with sustainable development but also, through scaled green practices, contributes to achieving industrial chain carbon reduction targets and the green transformation of the economic system.

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