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Resilient SME's in China: ESG Meets Quality

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ABSTRACT

The growing relevance of Environmental, Social and Governance (ESG) expectations, together with long-established Quality Management (QM) frameworks, is reshaping the sustainable operational landscape of Chinese SMEs. Although SMEs possess flexibility and innovation capacity, resource constraints hinder their ability to meet increasingly complex sustainability requirements. This study synthesizes global ESG developments, the status of ESG–QM integration in China, and practical insights from SME case evidence. Findings show that aligning ESG elements with existing QM processes—such as PDCA cycles, process optimisation and employee training—can generate cost-effective pathways to improve both operational quality and sustainability performance. However, challenges persist in disclosure standards, technical skills, and policy interpretation. The paper proposes an integrated ESG–QM framework that supports SMEs in advancing strategic competitiveness while contributing to China's broader “dual-carbon” goals.

Keywords: ESG; Quality Management; Chinese SMEs; Sustainability; PDCA Cycle; Corporate Competitiveness; Environmental Performance; Governance Systems

JEL Codes: M11, M14, Q56, L26, O44

1. Introduction

The growing integration of sustainability into global business practices has elevated Environmental, Social, and Governance (ESG) frameworks as essential instruments for evaluating long-term corporate resilience. Emerging from earlier corporate social responsibility (CSR) initiatives, ESG has evolved into a structured assessment paradigm increasingly demanded by regulators, investors, and supply chain partners (Shen, 2023). In China, the expansion of ESG reporting requirements, coupled with the government's “dual-carbon” strategy, has intensified expectations for enterprises across all scales. Consequently, Chinese small and medium-sized enterprises (SMEs) face mounting pressure to demonstrate effective environmental stewardship, robust governance structures, and meaningful social engagement, despite often having fewer resources and capabilities than larger firms (Porter & Kramer, 2006).

Although closely related, ESG and sustainability represent distinct conceptual frameworks. Sustainability encompasses long-term ecological and socio-economic resilience, whereas ESG provides measurable indicators that inform investment decisions, regulatory compliance, and supply-chain evaluations. This study examines how ESG metrics intersect with established quality management (QM) systems in Chinese SMEs, particularly those operating in manufacturing, electronics, and service sectors. Classical QM frameworks—such as ISO 9001, the PDCA cycle, and process-oriented continuous improvement—provide structured routines for enhancing product and service quality (Rebelo et al., 2016). These approaches emphasise systematisation, documentation, and iterative optimisation, aligning closely with the procedural and reporting demands of ESG. While ESG introduces additional dimensions of environmental and ethical responsibility, its requirements often overlap with or can be integrated into existing QM structures. International research increasingly recognises this potential synergy, highlighting the compatibility of quality-focused managerial cultures with sustainability-driven governance frameworks (Elkington, 1997).

Despite these conceptual complementarities, empirical evidence indicates that the majority of Chinese SMEs struggle to integrate ESG considerations into their established quality management routines. Challenges include limited professional expertise, inconsistent disclosure standards, weak data-collection infrastructure, and the high administrative burden associated with formal ESG frameworks typically designed for large corporations (Shen, 2023; Liu and Liang, 2022). Yet the strategic importance of SMEs — which account for more than 60 percent of China’s GDP and constitute over 90 percent of all registered enterprises — underscores the necessity of developing integration models tailored to their capacities and constraints. Against this background, this study investigates how ESG principles can be systematically incorporated into existing QM processes within Chinese SMEs. By combining theoretical insights with case-based analysis, the paper seeks to contribute to both academic understanding and practical guidance for sustainable competitiveness in the SME sector.

2. Methodology

This study adopts a qualitative, multi-method research design in order to explore the relationship between ESG, Quality Management (QM) and Sustainability in Chinese SMEs. Given the fragmented nature of the existing research and the rapid evolution of ESG practices, a systematic approach was required to identify, evaluate and synthesise the most relevant scholarly contributions. The literature collected and screened using the PRISMA protocol, which provides a transparent and replicable procedure for identifying eligible studies, assessing relevance and filtering out duplicates or low-quality sources (Page et al., 2021). The search process drew on international academic databases, including Web of Science, Scopus and China National Knowledge Infrastructure (CNKI - serving as a key database for Chinese research alongside global ones like Web of Science and Scopus), complemented by targeted searches of practitioner reports and Chinese regulatory documents. This ensured that both global and Chinese perspectives represented within the literature base.

Following the identification of the core literature, thematic coding was applied to extract dominant conceptual categories across the ESG and QM domains. Qualitative content analysis was used to classify recurring constructs such as sustainability reporting, process standardisation, risk management, environmental performance, stakeholder engagement and continuous improvement (Mayring, 2014). Codes were iteratively refined using an abductive approach, allowing themes emerging from empirical case material to inform adjustments to the coding schema (Timmermans and Tavory, 2012). This process helped to highlight both the conceptual synergies between ESG and QM, and the knowledge gaps particularly relevant for SME contexts.

To ground conceptual insights in organizational practice, this study employs a case-study methodology. The primary case, Shenzhen Daju Intelligent Control Technology Co., Ltd., was selected as an innovative manufacturing SME embedded in international supply chains, where ESG requirements are particularly salient. Data were collected through semi-structured interviews, internal documents, and publicly available ESG disclosures to capture the firm's challenges and opportunities.

For cross-case comparison and enhanced contextual validity, a second SME, Ningbo Huayi Lighting Technology Co., Ltd., was included. Specializing in LED lighting components for domestic and international markets, Huayi Lighting was chosen for three reasons: its exposure to sector-specific environmental and supply-chain pressures, its partial implementation of ISO 9001 and ISO 14001 enabling examination of ESG–QM integration in emerging systems, and the availability of transparent reports and disclosures suitable for rigorous analysis.

Data for both cases were collected between March and August 2025 via online interviews with senior managers and analysis of internal QM- and ESG-related documents, complemented by public sustainability reports. The interview protocol addressed governance routines, environmental performance, employee training, process standardization, and resource constraints. Triangulation of interviews, internal records, and public materials enhanced reliability and validity. Cross-case analysis identified shared patterns, divergences, and sector-specific integration barriers (Yin, 2018). By combining literature review, thematic content analysis, and comparative case studies, the study provides a comprehensive understanding of ESG–QM integration in Chinese SMEs.

Literature review

The academic and professional discourse on Environmental, Social and Governance (ESG) frameworks has expanded rapidly over the last decade, reflecting the increasing financial and regulatory significance of sustainability-oriented performance indicators. Early discussions of ESG closely connected to the evolution of Corporate Social Responsibility (CSR), but contemporary literature highlights a shift from voluntary social engagement to systematic, data-driven evaluation of corporate externalities (Eccles and Klimenko, 2019). International standards such as the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and most recently the IFRS International Sustainability Standards Board (ISSB) have become the dominant reference points shaping disclosure behaviours across industries (Kotsantonis and Serafeim, 2019). In China, the consolidation of ESG disclosure rules has been further accelerated by financial regulators and stock exchanges with research emphasising that transparent sustainability reporting has become a prerequisite for capital access and global supply-chain participation (Shen, 2023).

Quality Management (QM), in contrast, represents a more mature managerial discipline, grounded in the traditions of continuous improvement, standardisation and customer satisfaction. The ISO 9001 standard, widely applied across Chinese SMEs, provides a process-oriented framework emphasizing consistency, risk-based thinking, and systematic documentation (ISO, 2015). Classical models such as Deming's PDCA cycle, Juran's quality trilogy, and the principles of total quality management have profoundly shaped managerial routines, encouraging organisations to analyse processes, measure deviations and establish corrective actions (Rebelo et al., 2016). Scholars highlight that QM operates not only as a set of tools, but as a deeper organisational culture promoting discipline, transparency and data-driven decision-making (Oakland, 2014). These characteristics render QM a potential structural foundation for the implementation of ESG-related practices, particularly in resource-constrained SME environments.

Recent research increasingly explores the conceptual and practical intersections between ESG and QM, emphasising opportunities for integration. Studies demonstrate that the procedural logic of QM — especially its focus on risk mitigation, documentation and performance metrics — aligns well with ESG reporting requirements (Fonseca and Domingues, 2018). Furthermore, sustainability-oriented QM extensions such as ISO 14001 for environmental management and ISO 45001 for occupational health and safety highlight the historical convergence of quality and sustainability objectives (Prajogo et al., 2012). Scholars argue that ESG can be interpreted as a natural broadening of the quality concept: whereas traditional QM emphasised product and service quality, ESG expands this focus to encompass social equity, environmental stewardship and ethical governance (Elkington, 1997). However, despite these synergies, empirical studies reveal that SMEs often struggle to operationalise ESG–QM integration due to limited competencies, fragmented data systems and the high complexity of contemporary sustainability standards (Liu and Liang, 2022; Shen, 2023). This gap underscores the need for practical frameworks tailored to the needs and capacities of Chinese SMEs.

2.1. Comparison of the different literatures

A triangulated synthesis of the reviewed literature reveals both areas of convergence and notable contradictions across ESG and QM research streams. Many scholars emphasise the procedural compatibility between ESG disclosure requirements and QM routines, highlighting that both rely on structured documentation, measurable indicators and continuous evaluation (Rebelo et al., 2016; Fonseca and Domingues, 2018). This supports the argument that ESG can be integrated into existing QM systems with limited additional structural complexity. However, other authors stress that ESG introduces fundamentally broader responsibilities that extend beyond the traditional boundaries of product and service quality, encompassing societal and environmental dimensions that are not always reflected in classic QM frameworks (Elkington, 1997). This implies that integration requires cultural and organisational adjustments, not merely procedural alignment.

Contradictions also emerge regarding SMEs' readiness for ESG implementation. While some studies highlight SMEs' flexibility and innovation capabilities as key enablers of sustainability transformation (Liu and Liang, 2022), others note persistent gaps in resources, expertise and digitalisation that hinder systematic ESG adoption (Shen, 2023). These opposing perspectives suggest that SMEs vary widely in their starting conditions, and that integration models must be adaptable rather than uniform. Furthermore, comparative studies indicate differences across industries: manufacturing SMEs tend to have more mature QM infrastructures that can facilitate ESG integration, whereas service-sector SMEs often lack codified processes, making ESG implementation more challenging.

China's innovation ecosystem is characterised by three interconnected layers: (1) state-driven, mission-oriented technological upgrading; (2) market-driven incremental innovation; and (3) regional cluster-based innovation embedded in local industrial ecosystems. In the context of China's multi-layered innovation system, the flexibility of SMEs manifests most visibly in three domains. First, SMEs demonstrate high adaptability in process innovation, rapidly reconfiguring production workflows in response to changing customer requirements or environmental regulations. Second, they exhibit agility in incremental product innovation, especially in electronics, machinery and consumer goods, where short product life cycles require continuous small-scale design improvements. Third, SMEs play an essential role in supply-chain innovation, adjusting sourcing, logistics and quality routines to meet the evolving ESG and compliance demands of larger domestic and international partners. These forms of flexibility are characteristic of the market-driven and cluster-based innovation spheres, where SMEs can leverage their organisational agility.

However, resource limitations restrict their engagement in capital-intensive R&D or disruptive green innovation, which constrains their ability to meet advanced ESG-related technological requirements (Liu, 2019; Liu & Chen, 2021).

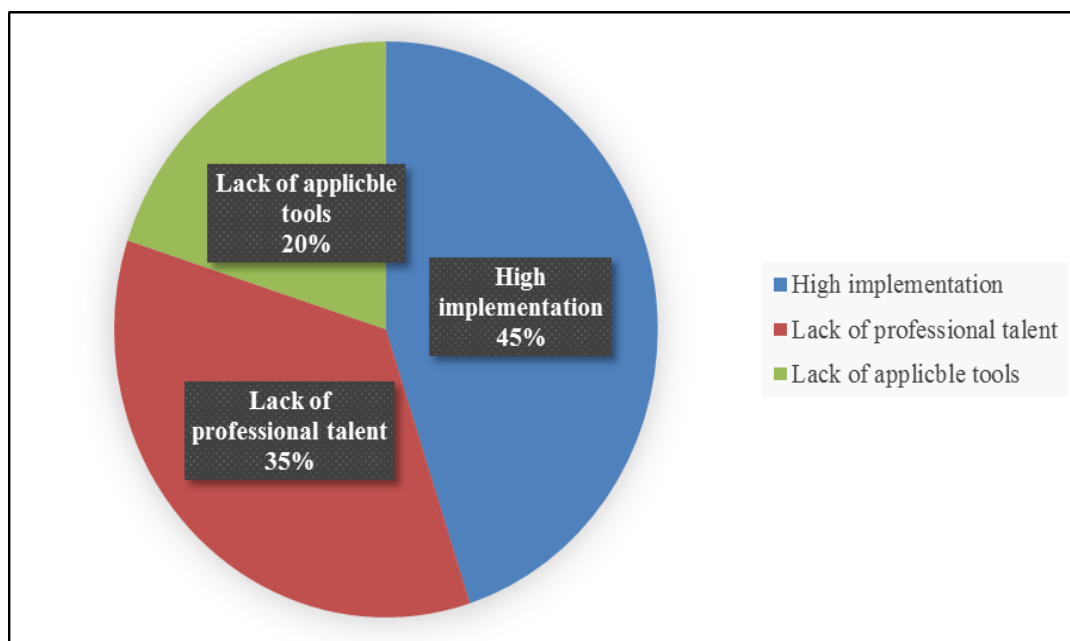
Taken together, the triangulated analysis demonstrates that the integration of ESG and QM is both theoretically feasible and practically complex. The literature shows clear complementarities in managerial logic, but also underscores context-dependent constraints that particularly affect sustainable business operations of the SMEs. These insights justify the need for a tailored ESG–QM framework that reflects the heterogeneous realities of Chinese SMEs.

3. Current Chinese SME's Landscape of ESG and Quality Management

In this study, Chinese SMEs are delineated according to the official criteria established by the Ministry of Industry and Information Technology (MIIT). Although thresholds vary by sector, manufacturing SMEs are typically defined as firms with fewer than 1,000 employees and annual revenues not exceeding RMB 400 million, while service-oriented SMEs are characterized by fewer than 300 employees and revenues under RMB 200 million. These classifications significantly influence SMEs' access to financing, innovation incentives, and regulatory obligations. A clear understanding of this institutional framework is crucial for evaluating the operational pressures imposed by environmental, social, and governance (ESG) as well as quality management (QM) requirements within the Chinese economic context (MIIT, 2011).

The adoption of ESG practices among Chinese SMEs exhibits considerable potential yet remains constrained by structural limitations. As the primary engine of China's economy, SMEs contribute over 60 per cent of national GDP and represent more than 90 per cent of registered enterprises, underscoring their pivotal role in the country's sustainable development agenda (Liu & Liang, 2022). Nevertheless, compared with large corporations, SMEs often lack the financial, technological, and human capital necessary for systematic ESG implementation. Empirical evidence suggests that fewer than 12 per cent of Chinese SMEs have established formal sustainability reporting mechanisms, and an even smaller proportion have incorporated ESG considerations into their strategic management processes (Shen, 2023). The pace of adoption is further hampered by the rapidly evolving ESG standards, the proliferation of reporting frameworks, and inconsistencies in regulatory interpretation across provincial and local jurisdictions.

Figure1. Key ESG Practice Challenges Reported by Chinese SMEs

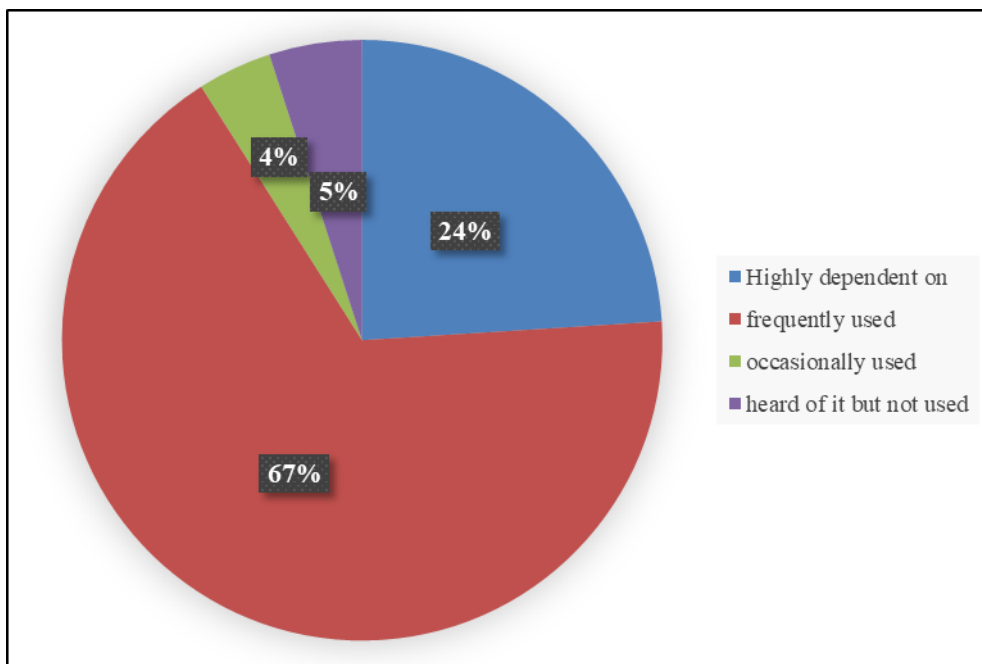


Source: Own edition based on Green Finance Research Institute, 2025; Related Interview, 2025)

Despite these contextual constraints, Quality Management (QM) practices are more widely diffused across the SME sector, particularly in manufacturing clusters where ISO 9001 certification, PDCA cycles and process standardisation are embedded in daily operations. Evidence suggests that many SMEs apply QM routines even without formal certification, relying on internal audits, customer complaint procedures and continuous improvement meetings to structure workflows (Rebelo et al., 2016). These pre-existing systems provide procedural scaffolding that may significantly lower the cost and complexity of ESG integration. For example, environmental indicators are generally the easiest to incorporate - due to their process-oriented nature - into PDCA cycles, governance-related responsibilities can be mapped to internal control procedures, and social metrics such as training hours or workplace safety can be embedded into existing audit checklists. Such complementarities underscore the argument that ESG implementation in SMEs is less about constructing new systems than about extending established quality routines into broader sustainability domains (Prajogo et al., 2012).

Nevertheless, gaps remain between theoretical potential and practical implementation. Empirical observations reveal that SMEs tend to prioritise short-term operational efficiency and cost control, while ESG demands longer-term, often intangible investments in environmental monitoring, labour standards, stakeholder engagement and data transparency (Kotsantonis and Serafeim, 2019). Many SME managers perceive ESG as an external compliance burden rather than an opportunity for performance enhancement, partly due to a lack of ESG literacy and limited exposure to sustainability-driven market incentives (Shen, 2023). Furthermore, digitalisation gaps hinder the consistent collection of ESG-related data, particularly in areas such as carbon emissions, energy intensity, waste streams and supply-chain traceability. These limitations pose significant challenges for SMEs seeking to align ESG implementation with existing QM structures.

Figure 2. Familiarity in ISO 9001:2015 standard among the Chinese SME's



Source: Own edition based on (United Nations Industrial Development Organization, 2016)

Finally, the degree of ESG–QM integration varies across industries. Manufacturing SMEs such as Shenzhen Daju Intelligent and Ningbo Huayi Lighting typically possess more structured QM foundations, enabling a clearer pathway to sustainability integration. By contrast, SMEs in sectors such as catering, retail or personal services often lack codified processes, making the introduction of ESG indicators more challenging. This heterogeneity highlights the need for differentiated ESG implementation strategies that reflect sector-specific operational realities. Combined with the insights from the literature review and methodological triangulation, the evidence presented in this section provides a contextual foundation for the subsequent case analyses, which further explore the dynamics of ESG–QM integration in practice.

4. Case Study Analysis

4.1. Shenzhen Daju Intelligent Control Technology Co., Ltd.

Shenzhen Daju Intelligent Control Technology Co., Ltd. (hereafter Daju Intelligent) operates within the high-tech manufacturing sector, focusing on intelligent control systems for industrial applications (Daju Intelligent Control, 2022). The company holds ISO 9001 certification and maintains a comprehensive Quality Management (QM) framework incorporating PDCA cycles, internal audits, and standardized process documentation. These established structures provide a robust foundation for integrating ESG practices, particularly in environmental and governance domains.

Empirical analysis indicates that Daju Intelligent has capitalized on its QM infrastructure to implement environmental performance metrics, including energy consumption monitoring, waste reduction initiatives, and supply-chain emissions tracking. Governance responsibilities—such as risk management and internal compliance reporting—are systematically aligned with existing audit and control procedures, minimizing redundancy and associated implementation costs.

Social performance indicators, including employee training hours, workplace safety adherence, and staff engagement initiatives, are embedded within routine performance evaluations and continuous improvement meetings (Prajogo et al., 2012; Rebelo et al., 2016)

Despite these enabling structures, Daju Intelligent faces challenges associated with ESG data digitalization, particularly in real-time environmental monitoring and supplier compliance verification. While internal processes are robust, data collection across external supply networks remains sporadic, reflecting broader SME limitations in digital infrastructure and ESG literacy (Shen et al., 2023; Green Finance Institute, 2025). Nevertheless, management perceives ESG initiatives not merely as compliance obligations but as strategic levers for operational efficiency and market positioning, illustrating an advanced organizational mindset toward sustainability (He, Chen and Chen, 2025).

4.2. Ningbo Huayi Lighting Technology Co., Ltd.

Ningbo Huayi Lighting Technology Co., Ltd. (hereafter Huayi Lighting) operates within the manufacturing and electronics sector, producing energy-efficient lighting solutions for domestic and industrial markets. Like Daju Intelligent, Huayi Lighting has embedded ISO 9001-based QM routines, including standard operating procedures, process audits and continuous improvement practices (Rebelo et al., 2016).

The company has actively pursued environmental sustainability initiatives aligned with national “Dual Carbon” targets, focusing on energy efficiency, waste management, and low-emission production processes (CSRCare, 2025). Social sustainability efforts include structured employee training programs, occupational health and safety protocols, and community engagement projects. Governance integration has been facilitated by internal reporting protocols and risk management procedures that align with the company’s QM framework.

Operational interviews indicate that Huayi Lighting experiences similar constraints as Daju Intelligent, particularly in tracking ESG performance across its supplier network and quantifying social impact in a standardized manner. Digitalization gaps remain a bottleneck for ESG data analytics, highlighting the critical role of technology-enabled solutions in bridging QM and ESG practices (European Digital SME Alliance, 2023; KPMG China, 2022). Nonetheless, the company demonstrates a proactive approach to embedding ESG within strategic decision-making, leveraging QM routines as scaffolding for systematic sustainability integration.

4.3. Cross-case Comparative Insights

A comparative analysis of Daju Intelligent and Huayi Lighting reveals key patterns and sector-specific dynamics in ESG–QM integration among Chinese manufacturing SMEs. Both firms leverage established QM frameworks—ISO 9001 certification, PDCA cycles, and internal audits—as structural foundations for embedding ESG indicators, supporting theoretical propositions that QM can reduce costs and facilitate sustainability adoption (Prajogo et al., 2012; Rebelo et al., 2016). Both companies satisfy the MIIT’s official SME criteria for their respective manufacturing sub-sectors, based on combined thresholds of employee numbers and annual revenue, ensuring comparability and alignment with nationally recognized definitions.

Environmental metrics are most readily integrated due to their process-oriented nature, whereas social indicators often necessitate qualitative adaptation and engagement across organizational levels. Governance integration benefits from existing control and reporting systems, yet SMEs continue to face challenges in aligning internal procedures with evolving regulatory expectations (Shen et al., 2023; CSRCare, 2025).

Case-specific differences highlight the heterogeneity of ESG adoption even within the same industrial cluster. Daju Intelligent prioritizes technology-driven environmental monitoring and supplier compliance, reflecting its high-tech industrial orientation, while Huayi Lighting focuses on energy efficiency and occupational safety, consistent with the operational realities of lighting manufacturing. Both cases emphasize the critical role of digitalization and ESG literacy as enablers of effective QM–ESG alignment (Green Finance Institute, 2025; European Digital SME Alliance, 2023).

Overall, cross-case insights support the argument that ESG adoption in SMEs is less about creating entirely new systems and more about extending existing quality routines into sustainability domains, while also tailoring strategies to sector-specific operational and technological contexts (Prajogo et al., 2012; Kotsantonis and Serafeim, 2019). These findings provide empirical grounding for broader theoretical claims regarding procedural complementarities between QM and ESG practices in SMEs.

Table 1. ESG–QM Integration Metrics in Case Study SMEs

Dimension	Shenzhen Daju Intelligent	Ningbo Huayi Lighting	Remarks
Quality Management (QM) Foundation	ISO 9001 certified; PDCA cycles; internal audits; process standardization	ISO 9001 certified; SOPs; internal audits; continuous improvement meetings	Both firms leverage robust QM structures as scaffolding for ESG integration (Rebelo et al., 2016)
Environmental Integration	Energy consumption monitoring; waste reduction programs; supply-chain emissions tracking	Energy efficiency initiatives; low-emission production; waste management programs	Environmental indicators are most easily embedded due to process-oriented nature (Prajogo et al., 2012)
Social Integration	Employee training hours; workplace safety metrics; staff engagement initiatives	Structured training programs; occupational health protocols; community engagement projects	Social metrics require qualitative adaptation across organizational levels; more challenging than environmental metrics
Governance Integration	Risk management and internal compliance mapped to audit procedures	Internal reporting and compliance protocols aligned with QM routines	Governance integration benefits from existing control systems, but evolving regulations create implementation gaps (Shen et al., 2023; CSRCare, 2025)
Digitalization Support	Partial digital monitoring of environmental and governance metrics; supply-chain data gaps	Limited ESG data analytics; supplier tracking constraints	Digitalization gaps constrain consistent ESG data collection and analytics (Green Finance Institute, 2025)
Strategic Perception of ESG	Viewed as opportunity for performance enhancement and market positioning	Integrated into strategic decision-making and operational efficiency goals	Both SMEs recognize ESG beyond compliance, leveraging QM as a procedural bridge (He, Chen and Chen, 2025)
Key Implementation Challenges	Real-time supplier compliance data; ESG literacy among middle managers	Standardized social metric measurement; digitalization across processes	Sector-specific operational realities shape integration pathways; high-tech manufacturing enables more structured ESG adoption

Source: Own edition based in the Table cited references

The summary presented in Table 4.1 highlights both convergences and divergences in ESG–QM integration across the two manufacturing SMEs. Both Shenzhen Daju Intelligent and Ningbo Huayi Lighting leverage established QM structures, including ISO 9001:2015 certification, PDCA cycles, and internal audit procedures, as foundational scaffolding for sustainability initiatives (Prajogo et al., 2012; Rebelo et al., 2016). Environmental indicators are the most straightforward to integrate, reflecting their process-oriented characteristics, while social metrics require qualitative adjustments and active engagement across organizational levels, making their systematic adoption more challenging. Governance responsibilities benefit from pre-existing internal control routines, yet evolving regulatory expectations and digitalization gaps hinder the comprehensive collection and analysis of ESG-related data, particularly across supply networks (Shen et al., 2023; CSRCare, 2025; Green Finance Institute, 2025). Strategic perceptions of ESG in both firms demonstrate a proactive stance: ESG initiatives are not merely viewed as compliance obligations but as tools to enhance operational efficiency and strengthen market positioning (He, Chen and Chen, 2025). Notably, sector-specific operational realities shape the depth and focus of ESG integration. Daju Intelligent, operating in high-tech industrial automation, emphasizes digital environmental monitoring and supplier compliance, whereas Huayi Lighting focuses on energy efficiency, occupational safety, and community engagement. Collectively, these observations confirm that SMEs can effectively extend existing QM routines into broader ESG domains, while highlighting the importance of tailored approaches that reflect firm-specific operational and technological contexts.

4.4. International Benchmarks and Lessons for Chinese SMEs

Global experiences provide instructive insights for ESG–QM integration in SMEs. Bosch demonstrates how a large multinational company systematically embeds environmental and governance objectives within corporate performance systems, linking climate targets and quality metrics across business units and supply networks (Bosch, 2023; 2024). Similarly, Toyota’s Lean Production System emphasizes process-centric, bottom-up improvements, where waste reduction, energy efficiency, and employee engagement are integrated into routine production practices (Teich, 2013; Palhau, 2024). For SMEs, these examples underscore that sustainability need not require entirely new systems: existing quality routines and lean tools can serve as cost-effective scaffolds to gradually incorporate ESG objectives, particularly when aligned with operational efficiency metrics.

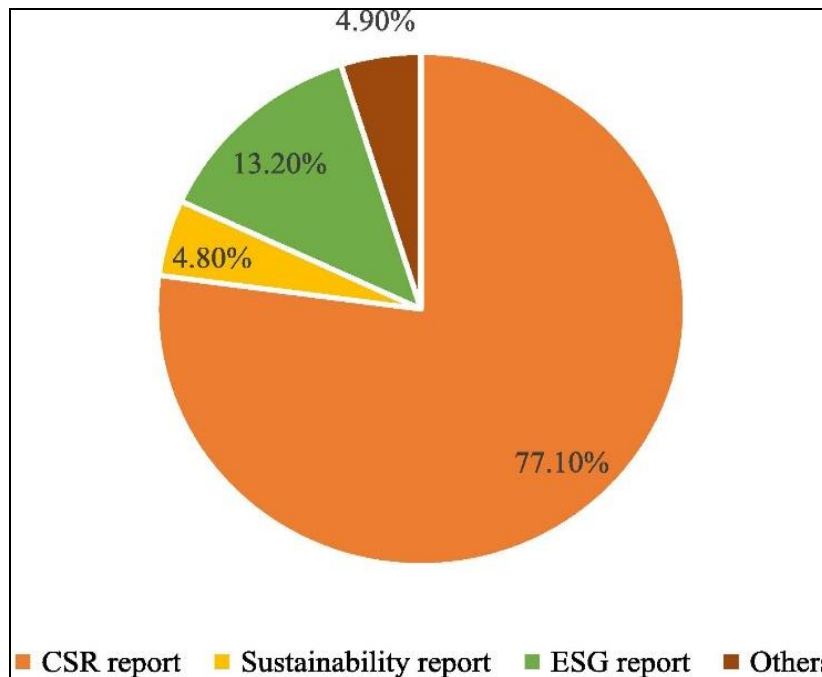
At the policy level, the European Union’s SME-focused disclosure frameworks offer “lightweight” approaches tailored to resource-constrained firms. Tools such as the Voluntary SME Standard (VSME) and digital self-assessment toolkits provide modular, phased guidance for ESG reporting, allowing smaller enterprises to integrate sustainability gradually without bearing the full burden of large-enterprise standards (EFRAG, 2023; European Digital SME Alliance, 2023). When compared to Chinese SMEs like Shenzhen Daju Intelligent and Ningbo Huayi Lighting, these international approaches highlight gaps in ESG literacy, digitalization, and structured support, while offering practical lessons for incremental, system-aligned sustainability adoption.

5. ESG–QM Integration Framework for Chinese SMEs

Taking into practice deep integration of ESG and TQM, Chinese SMEs still face many practical challenges. From the perspective of the external environment, industry differences lead to uneven implementation effects. Survey data shows that in the manufacturing sector, approximately 45% of SMEs have begun to experiment with dual-system integration, while in the service sector, this figure is less than 15% (Xinhua News Agency, 2023b).

Dual-system integration requires significant human and material resources, which puts enormous pressure on SMEs with tight budgets; second, talent shortage. There is a severe shortage of personnel with expertise in both quality management and ESG; third, cognitive limitations. Many business managers still view ESG as a cost burden rather than a development opportunity (Chinese Securities Journal, 2025).

Figure 3. Number of ESG reports disclosed by Chinese listed companies



Source: Chinese Association for Public Companies (2022).

Based on the literature review and empirical case evidence, this study proposes a four-step framework to guide the systematic integration of Environmental, Social, and Governance (ESG) considerations into existing Quality Management (QM) practices for Chinese SMEs. The framework leverages SMEs’ pre-existing procedural routines to reduce implementation costs, mitigate operational disruptions, and foster sustainable performance improvements.

Step 1: Identification of Key ESG Risks and Existing QM Touchpoints

The first step involves mapping ESG risks—such as energy consumption, waste generation, workplace safety, and labor conditions—against existing QM processes and organizational obligations (Prajogo et al., 2012; Shen et al., 2023). SMEs are encouraged to identify: a) Key ESG risks with operational and regulatory significance. b) QM processes that already generate relevant data, including PDCA cycles, internal audits, and customer complaint management. c) External requirements, encompassing customer expectations, industry standards, and local regulatory mandates.

This step ensures that ESG integration builds on familiar operational structures, enhancing managerial comprehension and minimizing additional resource demands.

Step 2: Embedding ESG into QM Tools

Once ESG risks and QM touchpoints identified, SMEs can embed ESG considerations directly into their operational tools and routines:

- Insert ESG Key Performance Indicators (KPIs) into PDCA cycles to link sustainability objectives with process improvement.
- Integrate environmental Critical-to-Quality (CTQ) metrics into Advanced Product Quality Planning (APQP) for product-level sustainability monitoring.
- Expand internal audits to include ESG criteria alongside traditional quality checks.
- Apply QM root-cause analysis methods to identify and resolve ESG-related process issues (Rebelo et al., 2016).

By embedding ESG into familiar QM instruments, SMEs can pursue sustainable objectives without overhauling their management systems.

Step 3: Low-Cost Implementation Measures

The framework emphasizes pragmatic, cost-effective initiatives that can be executed even under resource constraints:

- Energy-saving retrofits and process adjustments.
- Waste reduction programs integrated into existing production workflows.
- Employee ESG training using structured modules.
- Customer-feedback mechanisms specifically targeting sustainability performance.
- Pilot ESG reporting using simplified templates, such as GRI adaptations for SMEs (Shen et al., 2023; European Digital SME Alliance, 2023).

These measures enable SMEs to make measurable progress while controlling both financial and operational risks.

Step 4: Continuous Improvement and External Alignment

The final step focuses on sustaining ESG integration and preparing SMEs for broader stakeholder engagement:

- Benchmark ESG performance against industry peers and internal targets.
- Incorporate digital monitoring tools to improve data accuracy and reduce manual reporting efforts.
- Engage proactively with regulators and industry associations to ensure compliance and anticipate evolving standards.
- Prepare for partial or phased ESG disclosure to customers, investors, or supply chain partners (Green Finance Institute, 2025; KPMG China, 2022).

This step reinforces a dynamic, iterative approach, enabling SMEs to gradually advance ESG maturity without overextending organizational capacity.

The proposed four-step ESG–QM integration framework—Identification, Embedding, Low-Cost Implementation, and Continuous Improvement—provides SMEs with a structured, resource-conscious pathway to sustainability. By leveraging existing QM routines as procedural scaffolding, SMEs can transform ESG from a perceived compliance burden into a mechanism for operational improvement, risk mitigation, and strategic advantage, consistent with both theoretical insights and observed best practices (Prajogo et al., 2012; Shen et al., 2023).

Summary and conclusions

Environmental, Social, and Governance (ESG) frameworks are increasingly shaping the operational environment for Chinese SMEs. Integrating ESG principles into existing Quality Management (QM) systems offers a practical and cost-effective pathway for sustainable transformation. By leveraging established QM routines, SMEs can monitor environmental, social, and governance risks, embed ESG metrics into daily operations, and gradually align with national sustainability goals, such as China’s “dual-carbon” commitment. This approach allows SMEs to achieve improvements in both operational quality and sustainability without excessive resource burdens, transforming ESG from a compliance obligation into a strategic performance enhancer (Prajogo et al., 2012; Shen et al., 2023).

The study demonstrates that ESG and QM are mutually reinforcing rather than parallel systems. Managers in resource-constrained SMEs should avoid directly replicating “large-enterprise” ESG models. Instead, they should build on existing QM strengths, prioritize ESG issues with measurable business value, and foster cross-functional awareness and training. Government support is critical: simplifying ESG disclosure guidelines, developing sector-specific templates, providing training and digitalization subsidies, and exploring joint ESG–QM certification schemes can help SMEs overcome capability and funding constraints (European Digital SME Alliance, 2023; Green Finance Institute, 2025; CSRCare, 2025).

Limitations and Future Research Directions include the study’s focus on technologically advanced manufacturing SMEs, which may limit generalizability to traditional or service-oriented SMEs. The data are cross-sectional and rely on interviews and questionnaires, introducing potential subjectivity. Moreover, external validity is constrained by the Chinese regulatory and market context; comparative studies in other developing countries or across diverse industries could deepen understanding. Longitudinal research is also needed to capture the dynamics of ESG–QM integration over time. Despite these limitations, the findings provide actionable insights for SMEs seeking sustainable growth and offer a framework that balances ESG objectives with operational realities in resource-constrained settings.

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