

Data Analytics in ESG-Oriented Strategic Consulting: Drivers, Challenges and Optimization Pathways—A Case Study of Haier

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Abstract:

Today's firms must recognize that data analytics are vital to the future of many strategic consulting practices. For global manufacturing giant Haier, advances in ESG practices and performance are crucial amid tightening international requirements, China's dual carbon goals and organizational optimization needs. In examining the role of data analytics in supporting the ESG transformation and operational optimisation at Haier, the current study will examine the link between digital capabilities and the implementation and management of the ESG performance. The data analysis and ESG performance data provided by the company will be the two primary sources of data, and the case study method will be employed to assess the links between the digital capacity of Haier and the implementation and management of the ESG performance of the company. The findings show that regulatory pressure, market demand and corporate digital transformation drive ESG progress, yet key challenges persist, such as insufficient intra-organisational data-sharing, supply chain sustainability gaps and data fragmentation. Recommendations to enhance Haier's ESG performance include unified ESG data governance, organisational restructuring, strengthened supplier monitoring and better alignment with international reporting standards. These findings will provide guidance for organisations integrating data analytics into their ESG-driven strategic transformation initiatives.

Keywords: ESG, Haier, Data Analytics, Digital Transformation, Strategic Consulting

1. Introduction

A recent study of Chinese manufacturers confirms that digital transformation boosts overall ESG performance by enhancing information transparency, optimizing resource allocation and improving innovation efficiency. Strong big data infrastructure and analytics capabilities further elevate ESG performance and corporate value, emerging as a core driver of sustainable competitiveness. Haier Smart Home's ESG disclosure improves transparency and investor trust but faces challenges like limited data depth and non-standard reporting, while few studies explore how data analytics integrate with ESG-focused strategic consulting for leading groups like Haier. To this end, the purpose of this study is to address the following research questions: (1) What are the key drivers and challenges of Haier's ESG transformation and operational management in the current context? (2) What potential strategies and development pathways can be developed for Haier to enhance its ESG implementation and optimize its organizational structure in the future?

This research uses both literature review and case studies to explore how data analytics interacts with Corporate Social Responsibility (CSR) Practices, and how CSR Practices influence changes made by companies/organizations. It draws on both academic literature and Haier's published materials to gather information on the application of data analytics in supporting CSR initiatives. It also provides analytical and empirical insights into how data analytics can facilitate sustainable organizational development (SOD) and CSR decision-making, as well as practical implications for businesses pursuing SOD.

2. Current Drivers and Challenges in Haier's ESG Transformation

Haier's ESG transformation is shaped by both external pressures and internal strategic needs. As a leading Chinese home appliance manufacturer with a global footprint, the company has to respond to China's "dual-carbon" goals, tightening global sustainability standards, and growing expectations from investors and consumers. At the same time, Haier is leveraging its digital transformation to support ESG-related data collection and operational optimisation, but it still faces challenges in data integration, organisational coordination and supply-chain management.

2.1 Drivers of Haier's ESG Transformation

2.1.1 Regulatory and market pressure

After making a commitment to produce peak levels of carbon emissions by 2030 and achieve Carbon Neutrality by 2060, China sent a clear policy message to the manufacturing sector to increase energy efficiency and reduce emissions. Additionally, as a result of increasing global trends such as stricter regulations concerning climate change and increasing levels of ESG disclosures on capital markets, companies focused on export markets, like Haier, must also demonstrate valid performance in the area of sustainability.

Findings from various studies on Chinese A-share listed companies have shown that digital transformation is likely to enhance a company's capacity to achieve strong ESG performance. These studies have indicated that Digital Transformation provides businesses with the capability to address regulatory and stakeholder pressures more efficiently and effectively than previous technologies [1-3].

2.1.2 Digital transformation and data capabilities.

Haier has invested heavily in digital technologies—such as smart manufacturing systems, IoT-enabled production lines, and industrial internet-based platforms—to monitor energy consumption, emissions, and production in near real time. Also, research using larger samples of Chinese listed companies demonstrates that Digital Transformation and the introduction of Digital Technology is likely to result in improved ESG performance through improving the quality of Information Transparency and Supporting Green Innovation and Optimizing resource allocation [1,2,4]. In another study examining Big Data Infrastructure, researchers have found that companies that have better data systems tend to have significantly higher Overall ESG Scores, particularly in the Social and Governance areas [5]. These studies highlight how Haier's current Digital Capabilities will have a significant impact on Haier's ESG transformation.

2.1.3 Investor expectations and brand reputation.

Haier, as a well-established global organization, has become a significant competitor not only due to its ability to financially perform well but also because of the organization's reputation for being responsible and innovative in ESG practices. The ESG report for Haier in 2023 states that the Company has received higher external ESG rat-

ings and has won several awards for Sustainability, which provides Haier with a good foundation to enhance its reputation [6,7]. This external recognition encourages Haier to further invest in ESG practices on an ongoing basis and to continue to develop its reporting system regarding ESG practices.

2.2 Challenges in Haier's ESG Transformation

2.2.1 Fragmented ESG data and lack of standardisation.

Haier is still working to integrate ESG-related data throughout the organization and to various global regions, despite Haier's significant digital infrastructure. Different factories and subsidiaries collect environmental, safety and social data, with each factory potentially using different formats or indicators for the data collected. The 2023 ESG Report indicates that Haier's ESG information is collected from multiple internal systems and in response to various external reporting requirements; therefore, the company is actively working to improve the coverage, timeliness, and consistency of its ESG data [6]. The fragmentation of data across multiple internal and external reporting sources increases the complexity and workload of the reporting process for Haier and reduces the ability of advanced data analytics to support business decision-making.

2.2.2 Organisational coordination and ESG awareness.

It is essential to coordinate the diverse support functions of a large-scale industrial enterprise, including production, procurement, human resources, compliance, and information technology (IT), to integrate ESG into its core operations. The responsibility for ESG-related compliance may not always be clearly delineated at an operational level and some employees would consider ESG activities as disconnected from the business operations and simply added administrative duties. Based on the studies of Chinese publicly traded companies, even when firms invest heavily in technology to enable digital transformation, the ESG performance of the firms is determined by the governance quality, internal incentives and the level of management attention committed to them [3,4]. For Haier, it cannot simply rely on technology alone; it must also develop its organizational structure and business culture to promote the integration of ESG activities into daily operations.

2.2.3 Supply-chain sustainability risks.

Haier's global supply chain has a diverse group of upstream suppliers, each with differing capabilities and regulatory environments. Smaller size suppliers may not have established processes or digital tools to collect emissions and labour data related to ESG compliance. While Haier has endeavoured to advance the development of green supply chains, assess suppliers, and define ESG-related requirements as outlined in its ESG Report, full implementation of these standards remains lacking across its entire supplier base [6,7]. In practice this creates difficulty for Haier in consistently achieving the same ESG compliance standards throughout its entire value chain and highlights the need for improved data-sharing practices, digital auditing activities, and ongoing supplier development.

3. Future Development Paths and Strategic Directions for Haier's ESG Transformation

Considering the current drivers and challenges shaping Haier's ESG transformation, the next phase of this initiative will require strengthened data governance processes; improved cross-departmental coordination; and enhanced supply chain management capabilities to ensure transparency and resilience. Several of the strategic directions set forth in this section represent a method for Haier to improve on its ESG practices and obtain a sustainable competitive advantage in the long run.

3.1 Strengthening ESG Data Integration and Digital Governance

An ESG Data Lake would give Haier a central place to store and standardise all ESG related data and ultimately would enable Haier to have more accurate tracking of carbon emissions, energy consumption and operational productivity. In addition, serving as a centralized data hub, the data lake will enable Haier to automate data reporting and reduce the manual collection of laborious and unreliable ESG data. By establishing common standards, Haier will also create a solid foundation for the analysis of data related to ESG. The ability to perform advanced analytics on ESG data will enable Haier to see ESG patterns, inefficiencies and anomalies when they occur.

Moreover, Haier will also be able to introduce AI-driven ESG analytics into its operations (e.g. predictive mod-

els for carbon uncertainty, anomaly detection of energy spikes at the plant level and employing Natural Language Processing techniques to screen supplier compliance documents). By introducing these technologies, Haier will transition from “passive reporting” on ESG to “proactive sustainability governing.” In other words, by converting ESG data into actionable insights, Haier will be able to better anticipate regulatory risks, identify emerging environmental issues and optimise resource allocations across its factories and business units.

3.2 Building Stronger Organizational Structures and ESG Competencies

The second key consideration of this analysis is the link between coordinating an enterprise’s diverse functions to execute ESG initiatives and its capacity to build ESG awareness. Simply having access to digital tools does not mean that employees and managers have an adequate understanding of their ESG goals, roles and responsibilities, or evaluation criteria. Therefore, Haier needs to create an internal committee within the organisation focused on coordinating all aspects of sustainability within the organisation, including production, procurement, and human resources (HR), as well as compliance. The committee’s objective is to establish a unified sustainability vision, ensuring that each department aligns with the company’s ESG goals and oversees the quality of ESG data collected across the enterprise.

In addition to making structural adjustments to team roles and responsibilities across the company, Haier should also foster a stronger ESG-focused culture within the organisation. This is necessary to ensure that employees and managers view sustainability not as an additional obligation, but an essential requirement to achieve long-term success. By creating an educational programme both within and outside the organisation, including sustainability workshops for managers, ESG compliance training for factory supervisors, and ESG data governance training for employees involved in reporting, Haier can achieve the development of an internal culture for ESG that will integrate sustainability into daily decision making.

Another significant step would be integrating ESG metrics with the company’s performance evaluation and compensation systems. By linking management bonuses, promotions, and departmental key performance to ESG related performance metrics (such as energy saving targets, car-

bon footprints, waste management, supplier compliance, etc.) Haier can hold all levels of the organisation accountable for their ESG responsibilities, which will ultimately reduce resistance to implementing new processes for ESG and allow for the long-term changes necessary for behavioural change to occur within the organisation.

3.3 Advancing Supply-Chain Sustainability and Transparency

Since many of Haier’s upstream suppliers lack the necessary digital tools and ESG-related expertise, it is extremely challenging to ensure sustained compliance across its entire supplier base moving forward. To address this issue, Haier can develop a system that categorizes suppliers as they relate to their risk levels within the overall ESG framework as well as provide the requisite training, capacity-building opportunities, and compliance guidance for suppliers that may be struggling due to weaker ESG capacity.

Additionally, Haier could expand the use of digital tools to include both blockchain traceability and IoT-enabled monitoring of suppliers. In terms of blockchain, this technology will provide a much higher level of reliability regarding the supplier’s environmental performance, making sure that supplier environmental performance records remain free of tampering, while the IoT devices will provide access to real-time data concerning emissions, safety conditions, and waste generation. The application of these technologies will greatly increase transparency and reduce the manual audit burden, which is both expensive and difficult to scale.

Another recommendation for Haier would be to require its suppliers to utilize an ESG data platform to establish a mechanism for the exchange of real-time data and tracking. By integrating suppliers’ and Haier’s ESG data platforms, all parties could enhance mutual compliance, identify high-risk suppliers early, and collaborate to improve the sustainability performance of these suppliers. Long term, Haier could implement “green procurement policies” that reward suppliers who act in an environmentally responsible manner while gradually eliminating those suppliers that are unwilling or unable to meet the standards of the ESG framework.

Based on earlier sections of this report, it is clear that supplier supervision and engagement are two of the largest barriers that are preventing supply chain sustainability

from moving forward. This means that, if Haier wants to continue to grow its competitiveness on a global scale, the company needs to work closely with its suppliers and supervise them closely to ensure that they are meeting their obligations of sustainability.

3.4 Aligning ESG Disclosure with International Standards

To enhance its ability to compete internationally, Haier should also align its ESG reporting more closely with widely used international frameworks like the Global Reporting Initiative (GRI), SASB, and International Sustainability Standard Board (ISSB). These internationally established frameworks provide a consistent method for calculating carbon emissions, social performance and governance practices, making Haier's ESG disclosures easier for investors to understand and compare with worldwide competitors.

When Haier aligns with international standards, it also provides an advantage for attracting foreign investors who may base their assessment of risk on ESG metrics. Additionally, by using an internationally recognised standard, Haier will create consistency in sustainability efforts across all of its foreign subsidiaries, making it easier for the company to coordinate global ESG initiatives.

3.5 Preparing for Emerging ESG Challenges

While Haier has achieved great success in the area of ESG, there are still challenges ahead. There will likely be even tighter restrictions on carbon emissions from governments all over the world, which will require companies to perform more thorough accounting of their carbon footprints as well as conducting a lifecycle assessment (LCA) of their products.

With the increase in consumers looking for sustainable products, there is growing pressure on companies to design their products using environmentally friendly materials and produce products with a lower carbon footprint. This increase in demand for sustainable products has led to an increase in climate-related risks. As a result, climate-related risks have evolved into operational concerns, rather than just being viewed as a possibility for the future.

To prepare for these trends, Haier should continue to invest in environmentally friendly innovations, including developing and producing energy-efficient appliances

and using recyclable materials, as well as using smart home systems that reduce carbon emissions when using products. Additionally, Haier can enhance its climate risk assessment capabilities by developing robust climate risk evaluation and scenario analysis frameworks, enabling it to respond to and prepare for long-term sustainability threats.

4. Conclusion

This study explores how data analytics supports ESG-oriented strategic consulting for large manufacturers, with Haier as a case study. Its core objectives are to identify drivers and challenges of Haier's ESG strategy, and probe pathways for organizational optimization and sustainable performance. Drawing on literature reviews and Haier's ESG disclosures, findings reveal that internal digital capabilities and external stakeholder pressures jointly drive Haier's global ESG transformation; years of digital transformation investment have also laid a solid foundation for ESG data management and decision-making. Credible ESG reporting is critical for Haier to boost investor confidence, strengthen international competitiveness and sustain profitability as a global leader. Key obstacles to Haier's ESG implementation include data fragmentation across business units, cross-departmental coordination bottlenecks due to insufficient ESG awareness, and supply chain risks from upstream suppliers' immature ESG and digital capabilities. Despite notable progress, Haier's ESG program requires institutionalization and enhanced data governance. Corresponding strategies are proposed: establishing a unified ESG data platform with AI analytics and standardized data collection; optimizing organizational structure via an ESG steering committee, employee training and sustainability-aligned incentives; deploying IoT and blockchain for supply chain transparency; and aligning ESG disclosures with GRI, SASB and ISSB standards to enhance global credibility. Limitations of the single-case design and future multi-sector research directions are briefly noted.

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