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The Impact of Data Assetization on Corporate ESG Performance: Research Progress and Literature Review

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Abstract

Under the dual strategy of Digital China and new quality productivity, the connection between data assetization and corporate ESG performance provides a key micro-level link for their development at the enterprise level. This article reviews the related research on both, clarifies the progress made, and offers direction for future studies. Existing literature shows that research on data assetization is relatively new, mainly focusing on measurement methods and microeconomic effects; ESG-related research is more abundant, and the cross-study of the two mostly uses empirical analysis to test mechanisms and moderating effects. Current research mainly faces issues like relatively fixed mediating mechanisms, inconsistent measurement standards, and insufficient heterogeneity analysis, which can serve as references for future research.

Keywords

Data Assetization; ESG Performance; Literature Review.

1. Introduction

The Third Plenary Session of the 20th Central Committee of the Party clearly stated that it is necessary to improve the systems that promote the deep integration of the real economy and the digital economy, accelerate the establishment of basic systems for data property rights confirmation, market transactions, rights distribution, and security protection, and cultivate a nationwide integrated data factor market. Through market-oriented reform of data factors, we aim to activate new productivity, strengthen the digital foundation for high-quality development, and simultaneously improve the ecological civilization governance system and the long-term mechanism for green low-carbon development, coordinating the promotion of digital transformation and sustainable development. The 2026 Government Work Report further outlines: vigorously develop the green low-carbon economy, implement quality improvement actions for energy-saving and carbon reduction in key industries, and deeply promote the construction of zero-carbon factories and zero-carbon parks; accelerate the deep integration of digital technologies with green industries, and improve unified accounting standards for carbon emissions and sustainable development. The green low-carbon economy is driven by technological innovation at its core, relying on data factors to improve total factor productivity, and inherently requires enterprises to implement responsibilities across environmental, social, and governance dimensions. ESG builds a sustainability evaluation framework for enterprises through the three dimensions of Environment, Social Responsibility, and Corporate Governance. Its value orientation is highly compatible with the top-level requirements for the coordinated development of digital green initiatives and long-term corporate responsibility, and it has become a core measure of an enterprise's sustainable operations.

In September 2018, the CSRC revised the "Corporate Governance Code for Listed Companies," formally establishing a basic framework for ESG information disclosure in the domestic capital

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market; in December 2022, the CPC Central Committee and the State Council issued the "Twenty Measures on Data," establishing systems for data property rights, circulation, income distribution, and security governance as part of top-level design; in August 2023, the Ministry of Finance issued the "Interim Provisions on Accounting Treatment for Corporate Data Resources," which officially came into effect on January 1, 2024, for the first time clarifying that eligible data resources can be recognized as inventory or intangible assets, enabling the capitalization of data resources; in April 2024, the Shanghai, Shenzhen, and Beijing stock exchanges jointly issued the "Guidelines for Sustainability Reports of Listed Companies," comprehensively detailing quantitative standards for mandatory ESG disclosure, pushing companies to collect and standardize environmental, supply chain, and governance data resources. According to public statistics from King & Securities Evaluation, by 2025 the disclosure rate of ESG or sustainability reports in the entire market is expected to rise to 49.0%, marking the transition of ESG disclosure in A-shares from a phase of quantitative expansion to one of qualitative deepening, with 100% compliance achieved among mandatory disclosure entities. However, significant disparities exist in disclosure levels across different entities: high-carbon, heavily polluting industries and central state-owned enterprises significantly lead small and medium-sized private manufacturing enterprises in depth and quantitative disclosure. In practice, most enterprises only conduct scattered ESG data collection, without forming a standardized, measurable, and confirmable data asset system, highlighting real shortcomings such as weak ESG data governance capabilities, insufficient implementation of supporting systems for data assetization, and a low level of standardization in sustainable information disclosure.

Although the reform of data elements and the construction of ESG information disclosure systems continue to accelerate, existing research has not fully addressed the question of 'how data assetization affects corporate ESG performance.' On one hand, literature in the field of data assetization has already conducted fairly systematic discussions, from conceptual connotations (Wang Hansheng, 2019[8]; Xu Xianchun and Zhang Zhongwen, 2022[12]), measurement methods (Lu Zheng et al., 2023[14]; Zhao Henglei, 2025[18]) to microeconomic consequences (Sun Ying et al., 2021[16]; Xia Wenlei et al., 2025[30]). However, the research focus has mostly been on general business dimensions like corporate innovation performance and high-quality development, with few studies systematically integrating it into an ESG responsibility framework. On the other hand, research on ESG influencing factors has accumulated rich findings around topics like digital transformation (Wang Linlin et al., 2022)[38] and green finance, but 'data assetization,' as an independent variable distinct from generalized digitization - emphasizing data confirmation of rights, accounting, circulation, and the full-chain value conversion - still lacks a dedicated theoretical review regarding its systematic impact on ESG. It is worth noting that in recent years, some emerging cross-disciplinary studies have directly explored the relationship between the two (Yang Jie and Yu Chaoshen, 2025; Tang Liang and Yang Guoyu, 2025; Wang Haifang et al., 2025)[61-63], initially identifying mediating pathways such as alleviation of financing constraints, reduction of information asymmetry, and enhancement of dynamic capabilities. However, overall, the field is still in its early stages, with the deeper logic of action mechanisms, multiple cross-verifications of measurement, and precise portrayal of heterogeneous boundaries not yet systematically integrated. In view of this, this paper aims to clarify the theoretical framework of how data assetization affects corporate ESG performance through a systematic literature review and commentary, identify existing gaps and debates, and provide a clear theoretical starting point and research direction for subsequent empirical studies.

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2. Literature Review

2.1. Research on Data Assetization

2.1.1. Definition and Recognition Criteria of Data Assets

The meaning of data assets has gradually deepened with the evolution of theory and practice. When Richard E. Peters first introduced the concept of data assets in 1974, he equated it with tradable assets like government bonds and corporate bonds[1]. Later, with breakthroughs in information technology and the popularization of the Internet, scholars and institutions gradually shifted the definition of data assets from 'tradable financial assets' to 'core production factors of enterprises.' Algan (1997) emphasized the critical role of the quantity, quality, and usability of data assets in determining a company's market value[2]; the Data Management Association (DAMA, 2009) defined data assets as core assets that organizations need to manage effectively[3]; Fisher (2009), based on production factor theory, was the first to include data in the asset category, highlighting its value as a core production factor[4]; Toygar et al. (2013) interpreted the dual characteristics of data assets from an information systems perspective-containing both the structured characteristics of binary coding and the ownership dimension of physical storage media[5]; Gender and Steen (2017) further proposed that, in essence, data assets are assets with an electronic form, clear ownership, and accessibility[6].

In domestic research, the national standard 'Information Technology Service Governance Part 5: Data Governance Specification' emphasizes that data assets are 'controlled or owned by the organization and can generate benefits[7].' Wang Hansheng (2019) constructed a strict evaluation framework, proposing that data could only be classified as an asset if it met four criteria: historical transaction traceability, effective ownership control, compliance, and convertible commercial value[8]. Li Jingping (2020) and Xu Xianchun et al. (2022) identified three-dimensional features for recognizing data assets, namely verifiable ownership, measurable value, and realizable form[9-10]. Huang Weihua (2022), from an accounting perspective, defined it as 'data resources owned or controlled by the enterprise, electronically stored, and expected to bring economic benefits[11].' Xu Xianchun et al. (2022), following the SNA definition of 'assets,' added the economic characteristic of 'having application scenarios and repeated use in production for over a year[12].' Wang Yong et al. (2023), combining enterprise practice, proposed the three features of 'verifiable ownership, measurable, and tradable,' promoting the practical implementation of the concept[13].

2.1.2. Methods for Measuring Data as an Asset

Currently, mainstream methods for measuring data as an asset can be divided into two main paths: financial accounting methods and text analysis methods.

Financial accounting mainly includes the cost method, market method, and income method. Since valuing data resources is constrained by an immature market circulation mechanism and the difficulty of quantifying data element costs, traditional cost and market reference methods have limited applicability, making the income method a better choice. For example, Lu Zheng (2023) measures a company's implicit data assets using “ln(market value − fixed assets − financial assets − intangible assets)”[14]; Tambe et al. (2020) calculate data asset prices and quantities using actual data and find that data assets account for at least 25% of a company's total assets[15].

Text analysis typically follows the process of “determining seed terms, building a corpus, and conducting word frequency statistics.” Sun Ying et al. (2021) judge based on whether a company has a financial shared service center, data platform, or information system[16]; Wei Yanlin et al. (2022) and Zhang Junrui et al. (2023) use “data resources” and “data assets” as seed terms, expanding similar word sets with Word2Vec for word frequency statistics[17]; Zhao Henglei (2025) further uses seed words like “information,”“network,” “digital,”and “data,”

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expands the word set with Skip-Gram and deep learning, and separates the data assets into self-use (ODA) and tradable (DDA) categories for statistics, which helps address the issue of subjective bias in the word sets[18].

Both methods have their pros and cons-financial accounting relies on company data disclosures, so the sample is limited but more accurate; text analysis has broader coverage but may suffer from subjective keyword bias. Differences in measurement criteria are also one of the main reasons why current research on the economic impact of data as an asset draws inconsistent conclusions.

2.1.3. Study on the Economic Consequences of Data Assetization

(1) Macro Perspective

In research by Jones & Tonetti (2020), data is framed as a new type of production input that collaborates with labor resources during manufacturing processes; this combination yields extra economies of scale and fuels overall economic expansion[19]. To unpack how data elements shape long-run economic performance, Xu Xiang and co-authors (2021) constructed an endogenous growth model, which explicitly illustrates how capitalized data assets lift social and economic progress[20]. From a finance-focused lens, Li Wanli (2022) holds that assetizing data unlocks its latent financial characteristics. This enables data to permeate production, allocation and circulation links, thereby energizing real economic sectors[21]. Liu Yiwen (2022) further notes that policymakers ought to fully vitalize data elements, exploit their intrinsic value, and embed such resources within the national value-generating framework[22]. Separately, Zheng Lei (2020) views data assetization as a critical route to build a token-based digital economic system[23].

(2) Micro Perspective

When narrowing analysis down to individual firms, data assetization delivers multi-faceted support for corporate growth, with most transmission channels closely tied to the environmental, social and governance pillars of ESG.

For environmental outcomes and innovative capacity: Brynjolfsson and co-authors (2011) supplied empirical evidence that information assets carrying massive knowledge reserves streamline corporate decision-making and reshape core operational logic[24]. Farboodi & Veldkamp (2021) illustrated that structured deployment of data resources greatly lifts firms' data analytics proficiency and fuels their willingness to carry out technical innovation[25]. Ferraris et al. (2019) argued that robust big data integration enables cross-departmental resource scheduling to become more efficient[26]. Separately, Shen Guobing's research team (2020) verified that R&D data sharing frameworks facilitate joint innovation both inside and outside a firm's boundary[27]. Zhao Henglei (2025) further identified two underlying channels - information spillover and risk tolerance - via which data assetization lifts innovation output for small and medium-sized enterprises; such positive impacts turn out stronger for private tech firms located in eastern regions and those at mature development phases[18].

Next, data assets reshape resource allocation and push forward sustainable corporate growth. Taking the "Broadband China" policy as a quasi-natural experiment, Sun Ying et al. validated that data resources generate tangible benefits for technology service enterprises. According to Xu Lin (2025), such economic gains materialize in streamlined daily operations, accelerated technical upgrading and upgraded client service systems; cross-party collaboration both within and outside organizations ultimately helps businesses achieve sound, long-term growth[28].

Last, data assetization transforms financial resource allocation and expands inclusive financing modes. Drawing on Shenzhen's practice of collateral-free credit backed by data assets, Wang Lei (2014) stated that capitalized data opens alternative financing avenues and accelerates the construction of data factor trading markets[29]. Xia Wenlei (2025) discovered that data holdings boost corporate R&D spending: they ease financing frictions and strengthen joint

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research partnerships to stimulate innovative activity. For commercial banks, advancing data through resource sorting, asset valuation and capital circulation also raises enterprises' innovation budgets, demonstrating how updated financial tools back tangible economic sectors[30]. Beyond that, assetizing data accelerates firms' digital transformation and improves consumer service experience. By sorting raw data into structured formats, breaking internal information barriers and formalizing data as tradable assets, firms can also upgrade their financial management workflows.

2.2. Research on Corporate ESG Responsibility Fulfillment

2.2.1. Connotation and Evaluation System of ESG

ESG accountability acts as a concrete implementation framework built on sustainable development theories. This set of standards originates from the sustainable development viewpoint laid out within the 1987 Brundtland Commission Report. It was not until 2004 that the UN Global Compact formally finalized and released the integrated framework covering Environment, Social and Governance dimensions.

To break down its three core pillars: Environmental obligations center on corporate management of carbon output, waste discharge and overall energy usage (Wang Lin, 2023)[31]. Social commitments demand firms reconcile diverse interests from multiple stakeholders, ranging from regulators and internal staff to end consumers (Xiao Hongjun et al., 2021)[32]. As for governance, this dimension targets rationalizing revenue sharing mechanisms and mitigating conflicts stemming from principal-agent relationships (Yuan Rongli et al., 2022)[33].

When it comes to ESG rating frameworks, well-known international providers cover Bloomberg, MSCI as well as FTSE Russell. Within China, representative assessment platforms include Huazheng, Shangdao Ronglu and Shetou Alliance. Discrepancies exist across these rating bodies in two key aspects: how they assign weight coefficients to each metric, and the raw data they adopt for scoring. For this reason, academic researchers frequently select existing indexes or build customized evaluation systems tailored to their own research objectives (Gao Jieying et al., 2021; Su Chang & Chen Cheng, 2022)[34-35].

2.2.2. Drivers of ESG Responsibility Fulfillment

Factors pushing firms to fulfill ESG commitments fall into two broad groups: internal corporate incentives and outside contextual forces. From an internal perspective, enterprises pursue ESG construction to ease financing frictions (Qian Ming, 2017; Li Zhibin et al., 2022)[36-37], respond to the diverse demands of stakeholders (Wang Linlin et al., 2022)[38], as well as lift capital investment efficiency. As for external incentives, institutional supervision pressure and public media discourse serve as the two core catalysts (Run Tingfei & Wu Yanlong, 2019; Lokuwaduge et al., 2017)[39-40]. A firm's ESG performance arises from the joint interplay of these internal and external forces. On one hand, companies carry out ESG practices to seek long-term strategic value and satisfy external regulatory compliance requirements. On the other hand, when analyzing relevant influencing factors, scholars must take various competing motives and practical constraints into comprehensive consideration.

2.2.3. Economic Consequences of ESG Responsibility

Micro-level ESG studies are abundant and diverse. Concerning corporate value, academia holds three mainstream viewpoints: promotion, inhibition and non-linear relationships. Most literature supports the positive effect. Gillan et al. (2010) and Fatemi et al. (2018) verified that better ESG performance helps improve firm value[41-42]. Wang Linlin et al. (2022) summarized its mechanisms as easing financing pressure, optimizing operations and lowering financial risks[38]. In contrast, the inhibition view argues that ESG may increase operating costs and crowd out productive investment (Gray & Shadbegian, 2003)[43], especially when the ESG institutional system remains immature (Li Sihui & Zheng Sulan, 2022)[44]. Further, Wang Rong

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(2022) proposed an inverted U-shaped effect, indicating that ESG may hinder value growth in the short term but generate long-term benefits via reputation accumulation[45].

Studies on corporate performance show inconsistent findings. Li Jinglin et al. (2021) found that ESG and its sub-dimensions positively predict firm performance[46]. However, cross-national evidence suggests the opposite (Duque-Grisales & Aguilera-Caracuel, 2021)[47]. Additionally, Wang Shuangjin et al. (2022) identified a U-shaped relationship, which is further moderated by corporate competitive strategies[48]. In terms of corporate risk, existing conclusions are relatively consistent. ESG effectively reduces firms' default risk (Zhang Huili & Zhang Ni, 2022)[49], operational risk (Dong Xiaohong & Sun Zhenghan, 2023)[50], and stock crash risk (Shuai Zhenghua, 2022)[51]. Financially, ESG lowers debt financing costs (Lian Yonghui et al., 2023)[52], though this effect is insignificant for firms with extremely high financial risks (Xie Chi & Li Weiying, 2023)[53].

At the macro level, ESG benefits capital market performance. High-ESG firms attract more investor attention (Krüger, 2015)[54] and are favored by private equity investors (Crifo et al., 2015)[55]. ESG-related investment positively boosts stock returns (Zhou Fangzhao et al., 2021)[56]. Under the carbon neutrality background, ESG improvements raise corporate earnings per share (An Guojun et al., 2022)[57], while ESG disclosure helps mitigate stock price crash risk (Xi Longsheng & Wang Yan, 2022)[58].

To conclude, ESG's economic consequences present multi-dimensional and heterogeneous characteristics. Micro-level value and performance effects remain controversial, whereas its risk-suppressing effects are widely acknowledged. Macroscopically, ESG helps stabilize capital market operation. Wang Haifang et al. (2023) suggested that future research should further explore the underlying mechanisms to bridge the gap between theoretical research and practical application[59].

2.3. Cross-Study on Data Assetization and Corporate ESG Performance

Currently, the literature directly exploring the relationship between the two has been concentrated in recent years, with a limited but rapidly growing number of studies. Based on research perspectives, it can be summarized into three categories. First is direct impact testing. Yang Jie and Yu Chaoshen (2025) used panel data of A-share listed companies in Shanghai and Shenzhen from 2009 to 2023 and found that data assetization significantly improved corporate ESG performance and its three sub-dimensions, with self-use data assetization having a greater improvement effect than transactional[60]. Tang Liang and Yang Guoyu (2025) also confirmed the positive effect of data assets on ESG performance.[61] Wang Haifang and others (2025) further approached from the perspective of dynamic capabilities, finding that data assets directly enhance ESG performance through three dimensions of dynamic capabilities. Second is the exploration of mechanisms. Existing literature has identified multiple mediating paths[62]. Yang Jie and Yu Chaoshen (2025) verified three channels: "alleviating financing constraints-promoting value chain upgrading-reducing information asymmetry[60]." Yuan Zeming and Liu Jia (2025) extracted internal mechanisms of resource optimization and human resource enhancement, as well as external mechanisms of market alignment and strengthened supervision[63]. Wang Haifang and others (2025) showed in their mechanism analysis that data assets can indirectly improve ESG performance through two paths: promoting digital technology innovation and analyst attention[62]. Tang Liang and Yang Guoyu (2025) emphasized the mediating role of reduced information asymmetry and increased investor attention. Third is the moderating effects and boundary conditions[61]. Chen Zhongwei and Xu Zhiyong (2025) found that in high-tech companies, those with high degrees of digital transformation, strong ESG performance, and light assets, tech finance more effectively promotes data asset allocation[64]. Mao Chunmei and others (2025) confirmed from the

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opposite perspective that ESG performance positively moderates the influence of data assets on green innovation capability[65].

3. Literature Review

3.1. Main Contributions of Existing Studies

Looking at the literature so far, research on the intersection of data assetization and corporate ESG performance hasn't been around for long, but it has grown quickly in recent years. Theoretical studies often rely on classic theories like the resource-based view, signaling, and dynamic capabilities to build analytical frameworks. They not only map out several transmission channels, such as easing financing constraints, reducing information asymmetry, and promoting industrial chain upgrades, but also take into account boundary factors like ownership type and industry differences that can change the effects between the two. On the empirical side, text mining is commonly used to quantify corporate data asset levels, which also provides practical ideas for large-sample panel regression analysis. Overall, the existing research has already set up a basic theoretical framework and offers plenty of empirical references for digging deeper into this topic later.

3.2. Limitations of Existing Research and Pending Issues

Although both areas of research have been fairly well studied individually, cross-disciplinary studies are relatively lacking, and the existing literature still has the following limitations:

(1) The deeper logic of the mechanisms involved needs further exploration. Most current studies focus on traditional channels such as financing constraints, information asymmetry, and analyst attention, while the unique transmission mechanisms of data assetization are still insufficiently examined. For example, could data assetization improve ESG performance through unique pathways such as enabling green technology innovation (e.g., using carbon footprint tracking data to drive improvements in clean production processes), strengthening supply chain responsibility collaboration (e.g., standardizing and confirming supplier labor data to enforce ESG compliance), or enhancing compliance management efficiency (e.g., quantitative early warnings of environmental penalty risks)? These mechanisms have not yet been systematically empirically tested.

(2) Differences in measures of data assetization have not been fully considered. Most current studies rely on text analysis to measure the level of corporate data assetization, with only a few attempting financial accounting methods (such as recorded amounts or data asset trading values). Each method has pros and cons: text analysis has broad coverage but subjective measurement errors, and it is difficult to distinguish between "data resource reserves" and "data assets officially recognized on balance sheets"; financial accounting measures are more precise but are limited by corporate disclosure willingness, often facing small sample sizes and selection bias. More importantly, are the research conclusions based on these two measures robust? If both methods are cross-validated in the same study, will the results differ significantly? These questions remain unanswered.

(3) The granularity of heterogeneity analysis is not fine enough. Current heterogeneity studies mainly look at conventional dimensions such as ownership type, industry attributes, and company size, and have not touched on structural factors directly related to data assetization. For example, deeper dimensions such as the development level of regional data markets (e.g., the establishment of data exchanges, completeness of data circulation policies), the progress of corporate data rights confirmation (e.g., whether data resource ledgers have been registered), and industry data density (e.g., intensity of data input) could significantly condition the marginal effects of data assetization on ESG performance and deserve further investigation.

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4. Conclusion

To overcome existing research deficiencies, scholars may advance relevant analysis along three directions:

First, extend transmission logic and identify exclusive channels of data assetization. Integrate green innovation, supply chain ESG coordination and compliance cost control into mediation examinations, separate its impacts from regular digital upgrading, and adopt moderated mediation models to capture how institutional and market conditions shift such effects.

Second, integrate diverse measuring tools for mutual verification. Adopt both textual and financial metrics to carry out robustness tests, leverage machine learning to polish textual indicators, or build composite indices to fully evaluate firms' data assetization status.

Third, conduct more granular heterogeneous grouping tests. Add regional data factor policies, corporate data confirmation progress and industrial data input features to layered examinations, contrast data assets' varied ESG-boosting effects across contexts, and offer theoretical foundations for targeted policy formulation.

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