

Original Paper

Analysis of Problems and Countermeasures Regarding the Capitalization of R&D Expenditures from an ESG Perspective

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Abstract

In current accounting practices, the capitalization of R&D expenditures has garnered increasing attention, particularly against the backdrop of deepening innovation-driven development policies and ESG principles. This paper analyzes the issues of inadequate integration of environmental costs, ambiguous definition of social costs, and insufficient decision-making transparency in R&D capitalization from the perspective of the three pillars of ESG—environmental, social, and governance. It proposes corresponding countermeasures across four dimensions: ESG disclosure systems, accounting policies, accounting personnel, and external auditing.

Keywords

ESG, R&D Expenditure Capitalization, Environmental Costs, Social Costs, Corporate Governance

1. Introduction

ESG stands for Environmental, Social, and Governance, representing a comprehensive framework for evaluating a company's sustainability capabilities. It encompasses a company's performance in environmental protection, social responsibility fulfillment, and corporate governance. As investors, regulators, and the public increasingly focus on non-financial corporate performance, ESG metrics have become a critical factor influencing corporate financing, brand reputation, market competitiveness, and even long-term viability.

The capitalisation of research and development expenditure is a critical component of corporate financial management, profoundly impacting the accuracy of financial statements and corporate valuation. Under current accounting standards, eligible R&D expenditure incurred during the development phase can be recognised as an intangible asset and amortised over future periods (Ministry of Finance of the People's Republic of China, 2006). This approach more accurately reflects

the return cycle of corporate R&D investments, optimises financial structures, and enhances short-term profitability metrics. However, capitalising R&D expenditure requires meeting stringent conditions, including technical feasibility, the likelihood of future economic benefits and the measurability of the expenditure. Improper handling may distort financial information and lead to misjudgements in the market regarding the company's innovation capabilities and risk management capacity.

There is a profound intrinsic connection between ESG principles and the capitalisation of R&D expenditure. Under the ESG framework, enterprises are increasingly prioritising long-term value creation, with R&D innovation serving as the core driver of technological advancement, product upgrades and green transformation. Decisions regarding the capitalisation of R&D expenditure impact financial performance and are closely linked to a company's sustainable development strategy. ESG also emphasises transparency and accountability in information disclosure. The reasonableness and standardisation of R&D capitalisation directly impact the quality and credibility of financial information, thereby influencing investors' assessments of a company's innovation capabilities, growth potential and risk management proficiency. In cutting-edge fields such as green technology, artificial intelligence and biopharmaceuticals, the scientific rigour of R&D capitalisation policies is often a key metric for evaluating a company's ESG performance.

However, enterprises still face numerous practical challenges. For example, how should the scope of capitalising R&D expenditure be defined? How can the long-term orientation of ESG principles be reflected while meeting accounting standards? How can a balance be struck between improving financial performance and ensuring transparency of information? These issues involve not only the technical aspects of accounting treatment, but also coordinating corporate strategy, governance structures and social responsibility. Therefore, accurately capitalising R&D expenditure in line with ESG principles is critical to driving high-quality corporate development and achieving a win-win outcome in terms of economic and social benefits.

2. Analysis of Problems Regarding the Capitalization of R&D Expenditures from an ESG Perspective

2.1 Environmental Perspective

From an environmental perspective, traditional capitalization methods for R&D expenditures often emphasize the economic value of technological achievements while overlooking the underlying environmental costs and risks (Liu, 2025). This approach has revealed significant limitations in today's era of accelerated green transformation. R&D activities are not "neutral" processes. Particularly in green technology innovation, enterprises frequently invest substantial resources to comply with environmental regulations, reduce carbon emissions, and minimize ecological footprints when developing new products or technologies. These investments should be explicitly reflected as part of environmental costs in financial reporting. However, current accounting standards provide only general guidelines for capitalizing R&D expenditures, without mandating separate disclosure of

environment-related investments and risks. Consequently, many companies include green technology investments and environmental compliance costs within total intangible assets when capitalizing R&D expenditures, lacking detailed accounting for environmental attributes.

This practice may lead to three significant issues, as illustrated in Figure 1.

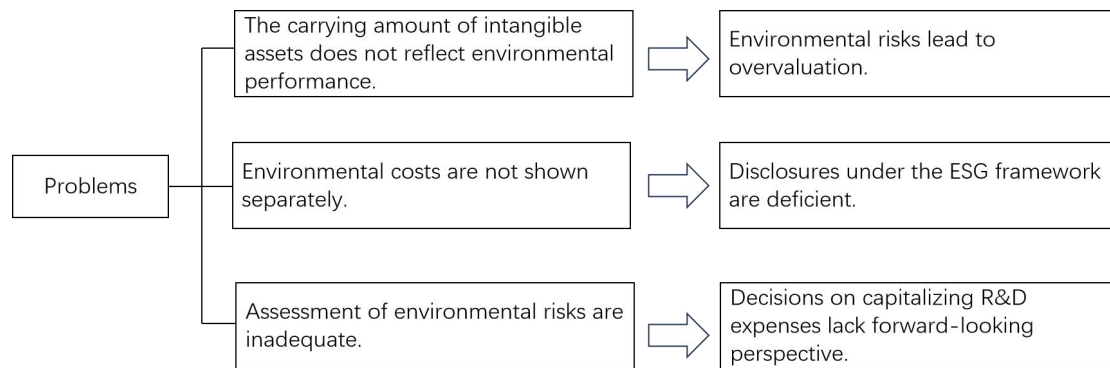


Figure 1. Problem Analysis Diagram from an Environmental Perspective

Firstly, the book value of intangible assets does not accurately reflect their environmental performance. For example, a technology may be valued highly for financial purposes, but if its production process or operational phase carries significant environmental pollution risks, its actual value could be overestimated.

Secondly, as environmental costs are not disclosed separately, external stakeholders, including investors, regulators and the public, struggle to assess the true ecological impact of R&D projects through financial reporting. This contradicts the fundamental requirement of 'visualising environmental costs' within ESG frameworks.

Thirdly, if companies fail to adequately evaluate and disclose environmental risks during R&D expense capitalisation, the financial information will lack forward-looking insight, which hinders proactive risk management under ESG principles. Environmental risks associated with R&D projects are highly uncertain. Factors such as climate change, resource depletion and policy shifts could have a significant impact on project sustainability in future. R&D initiatives in high-pollution industries could face asset impairment risks due to the potential tightening of environmental regulations in the future. Failure to consider environmental risks during capitalisation may leave companies unprepared when such risks materialise.

2.2 Social Perspective

From a societal perspective, the capitalisation of R&D expenditure goes beyond a company's internal financial accounting to include its use of social resources and its responsibilities during the innovation process. Current accounting standards for capitalising R&D expenditure focus primarily on financial metrics, such as technical feasibility and future economic inflows. However, these standards lack clear definitions and measurement frameworks for social costs incurred during R&D. This includes expenses

related to specialised employee training, occupational health and safety, and community relations maintenance. This ambiguity in accounting practices often causes enterprises to conflate these socially attributed expenditures with routine administrative expenses, meaning they are not incorporated into the value composition of R&D assets.

Such vagueness in accounting makes it difficult for external stakeholders to accurately identify and evaluate the social responsibilities of enterprises in their R&D activities through financial statements. When high-tech enterprises announce substantial R&D investments without disclosing their actual expenditure on employee occupational health and safety, external parties cannot grasp the true societal cost of their innovation activities. This undermines the transparency and credibility of financial information in corporate social performance assessments, as well as diminishing the accuracy and reference value of social dimension data within ESG evaluation frameworks.

Furthermore, this information asymmetry may lead to market misjudgments regarding a company's fulfillment of social responsibilities. When enterprises obscure social costs to embellish their financial performance, they may secure higher market valuations or policy support in the short term. However, in the long run, once these social cost issues surface, they will not only damage the company's reputation and sustainable development capabilities but also undermine the foundational trust of the entire industry and even the capital markets. Therefore, establishing a clear and operational mechanism for defining and measuring social costs is not only an intrinsic requirement for refining the R&D expenditure capitalization system but also a critical pathway for enhancing corporate social responsibility transparency and promoting the healthy development of ESG frameworks.

2.3 Corporate Governance Perspective

From a corporate governance perspective, capitalising R&D expenditure poses risks of insufficient decision transparency and manipulation. According to Accounting Standard for Business Enterprises No. 6 — Intangible Assets, R&D activities must be categorised as either research or development. Expenses incurred in the former phase should be expensed, while those incurred in the latter may only be capitalised when specific conditions are met. However, in practice, this classification lacks clear quantitative criteria, giving management significant discretionary power over its implementation. Some enterprises subjectively classify basic research expenditure as development expenditure, thereby inflating intangible asset values and embellishing financial statements.

This practice violates the substance-over-form principle of accounting standards and contradicts governance requirements within ESG principles, raising doubts among stakeholders about the reliability of financial information (Wei, 2025). The ESG framework emphasises that enterprises should demonstrate scientific rigour, transparency and accountability in decision-making processes. Arbitrary adjustments to capitalise R&D expenditure clearly undermine the credibility of financial information. Currently, most technology-focused listed companies disclose vague criteria for determining development stages in their annual reports, such as “relatively high technical feasibility”, without providing concrete evidence such as specific technical milestones, market projections or legal support.

Such insufficient disclosure makes it difficult for external auditors and investors to accurately assess the company's true financial condition.

Furthermore, manipulative practices in capitalizing R&D expenditures may trigger a chain reaction. Inflated intangible assets will impact future profit and loss through amortization, thereby misleading market assessments of a company's growth potential and profitability. In recent years, several domestic listed companies have faced exchange inquiries or administrative penalties over R&D capitalization issues. Regulatory authorities have identified these as inflated assets and required retrospective adjustments.

3. Analysis of Countermeasures Regarding the Capitalization of R&D Expenditures from an ESG Perspective

3.1 Establishing an ESG-Oriented Disclosure Framework for Capitalizing R&D Expenditures

Establishing a comprehensive ESG disclosure system is a crucial measure for promoting corporate sustainability and enhancing market transparency (Li & Cui, 2025). Within this framework, the creation of a dedicated disclosure mechanism for capitalized R&D expenditures is particularly critical. Currently, enterprises invest substantial resources in R&D activities. These funds not only drive technological breakthroughs but also profoundly impact environmental, social, and governance structures. Therefore, it is necessary to establish a dedicated disclosure framework for capitalized R&D expenditures within the ESG disclosure system to enhance information integrity and comparability. The conceptual design is illustrated in Figure 2.

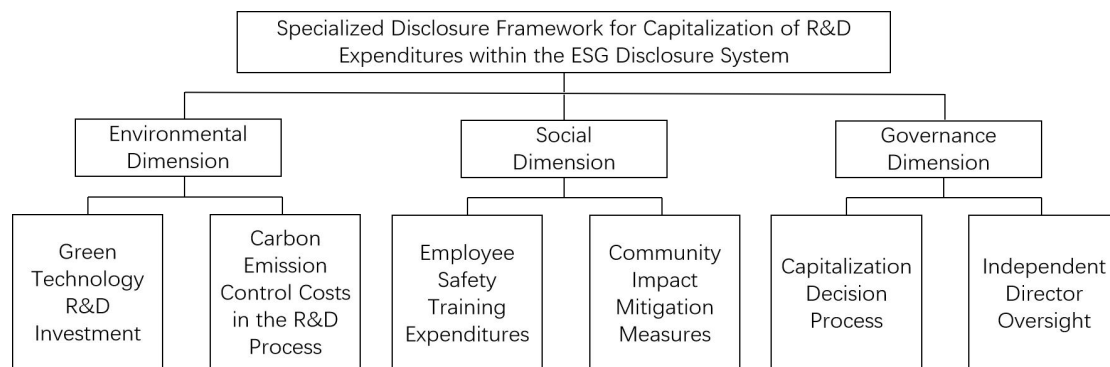


Figure 2. Design Diagram for the Specialized Disclosure Framework on Capitalization of R&D Expenditures within the ESG Disclosure System

On the environmental dimension, enterprises should explicitly disclose costs related to environmental protection within their R&D projects. For instance, investments in green technology R&D serve as a key indicator for measuring corporate environmental responsibility. Such expenditures may encompass funding allocated to clean energy technologies, energy-saving and emission-reduction processes, and the development of eco-friendly materials. Additionally, costs incurred during R&D to control carbon emissions—such as expenditures on carbon footprint monitoring and carbon offset projects—should

also be listed as part of environmental costs. These data not only help external stakeholders evaluate a company's environmental efforts but also provide policymakers with a basis for formulating green incentive policies.

On the social dimension, disclosure of R&D expenditures should cover investments related to employee well-being and social responsibility. For instance, expenditures on safety training for R&D personnel demonstrate not only concern for employee health but also reflect the company's governance standards in workplace safety. Furthermore, R&D activities may impact surrounding communities through noise pollution, traffic congestion, and other factors. Companies should disclose compensation payments or mitigation measures implemented to address these effects. Publicizing such information fosters trust between the company and the community, enhancing its social reputation.

On the governance dimension, the decision-making process for capitalizing R&D expenditures should be detailed to demonstrate the company's governance standards and transparency. For instance, companies should outline the specific approval procedures for capitalization, including the composition of decision-making bodies, approval criteria, and risk assessment mechanisms. Opinions from independent directors should also be disclosed as key content to demonstrate the independence and fairness of decision-making. By combining quantitative data with qualitative explanations, companies can comprehensively showcase their R&D governance capabilities, thereby strengthening the confidence of investors and regulatory authorities.

Additionally, to ensure the comparability of disclosed information, regulators may consider developing standardized disclosure templates or guidelines that clearly specify the content and format for capitalization disclosures of R&D expenditures. Relevant authorities may require companies to dedicate a specific section in their annual ESG reports to separately list R&D expenditures under environmental, social, and governance categories, accompanied by detailed explanatory notes. Simultaneously, companies are encouraged to adopt internationally recognized disclosure standards, such as the Global Reporting Initiative (GRI) or the Task Force on Climate-related Financial Disclosures (TCFD) framework, to enhance the international recognition of their information.

3.2 Incorporating ESG Factors into the Capitalization Guidelines for R&D Expenditures

Against the backdrop of global advocacy for sustainable development, enterprises must focus not only on financial performance, but also take on greater responsibility for environmental, social and governance (ESG) issues. However, current accounting standards still have significant shortcomings when it comes to disclosing corporate ESG performance and risks. This makes it difficult to reflect ESG outcomes comprehensively in innovation activities. In particular, existing standards primarily emphasise the technical feasibility and future economic benefits of R&D expenditure, overlooking its potential environmental and social impacts. To enhance the transparency and decision-relevance of accounting information, it is necessary to systematically integrate ESG factors into the regulatory framework for capitalising R&D expenditure.

Firstly, environmental compliance and social adaptability must be explicitly established as prerequisites

for capitalising R&D expenditure at the accounting policy level. This means that, when making capitalisation decisions for R&D projects, enterprises must evaluate not only technological maturity and market prospects, but also ensure that projects align with environmental regulations, low-carbon objectives and social responsibility requirements. High-pollution or high-energy-consumption R&D projects should be ineligible for capitalisation, even if they have significant commercial value. This prevents companies from masking their negative environmental and social impacts through accounting manoeuvres. This upfront requirement will encourage enterprises to proactively mitigate ESG risks during the innovation process, thereby enhancing their long-term sustainable development capabilities. Secondly, an 'ESG adjustment clause' should be introduced within R&D capitalisation guidelines to permit companies to capitalise a portion of green R&D expenditure, provided they meet specific ESG standards. Expenditure on acquiring low-carbon equipment or energy-efficient laboratory instruments, or on paying R&D personnel fair wages, may all be considered ESG-oriented R&D investments. This adjustment broadens the scope of capitalisation and provides financial incentives for enterprises to prioritise green technologies and safeguard employee rights during R&D, achieving a win-win outcome in terms of economic and social benefits.

3.3 Enhancing Accounting Personnel's Ability to Determine Capitalization of R&D Expenditures

Solid financial knowledge is essential for corporate accountants, and the ability to comprehensively assess the capitalization of R&D expenditures must also be continuously enhanced. The capitalization of R&D expenditures presents a significant challenge in accounting practice, particularly in high-tech industries where R&D activities are frequent and complex, involving numerous judgments on phase delineation. With the rise of ESG principles, corporate decisions on R&D projects should consider ESG factors alongside technical and financial feasibility, ensuring judgments align with standards and reflect sustainable development concepts (Cheng, 2016).

To enhance the professional competence of accounting personnel in this area, enterprises must implement systematic training programs. Training content should encompass traditional accounting standards, capitalization criteria, and ESG knowledge—including how to reasonably allocate environmental costs to R&D projects and how to quantitatively assess social value.

3.4 Strengthening External Audit Verification of Capitalization of R&D Expenditures

As accounting standards gradually expand, upgrading auditing standards has become particularly crucial (Wei, 2025). In light of escalating demands within the domain of auditing, it becomes imperative for auditors to accord priority to the verification of the Environmental, Social and Governance (ESG) relevance of capitalised expenditures. It is imperative that external auditors not only focus on the accuracy of financial data, but also assess whether the capitalization of R&D expenditures aligns with sustainable development.

From an environmental perspective, auditors should prioritise verifying the authenticity and rationality of corporate investments in green technology R&D. It is submitted that certain companies may seek to disguise routine technological upgrades as "green innovation" in order to secure policy incentives and

capital market attention. In order to ascertain the authenticity of environmental benefits, auditors are required to utilise project initiation documents and third-party testing data.

From a social perspective, audits must critically focus on the compliance of employee R&D welfare expenditures. These expenses constitute a substantial proportion of corporate labour costs and function as a metric for evaluating social responsibility fulfilment, encompassing R&D personnel compensation. It is incumbent upon auditors to verify the authenticity of expenditures against compensation structures and benefit systems, investigating instances of falsified reporting or misappropriation of R&D funds.

From a governance perspective, auditors must rigorously examine the fairness and transparency of corporate decision-making processes regarding the capitalization of R&D expenditures. It is imperative that robust internal control mechanisms are established, and that the scientific justification and compliance of capitalisation decisions are evaluated. Furthermore, any potential profit manipulation by management must be investigated.

4. Conclusion

Accurate capitalization of R&D expenditures is crucial for enterprises to authentically reflect innovation value and maintain stakeholder trust. Optimizing this process through ESG principles not only addresses shortcomings in integrating environmental costs and defining social costs but also enhances information transparency through standardized governance. While this path requires overcoming multiple challenges, such as adapting accounting standards and enhancing personnel capabilities, it drives enterprises to integrate sustainability concepts into innovation practices. Ultimately, this achieves synergistic growth in financial performance and social value, laying a solid foundation for long-term corporate development (Zhang, 2012).

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