

Multidimensional Construction and Indicator Selection of an Evaluation System for Scientific Journals under the ESG Framework

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ABSTRACT

Against the backdrop of advancing global sustainable development goals, traditional evaluation systems for scientific journals often fail to comprehensively reflect their environmental responsibilities, social values, and governance efficacy. This study introduces the Environmental, Social, and Governance (ESG) framework into the evaluation of scientific journals. Through theoretical analysis and indicator design, it constructs a three-dimensional evaluation system encompassing environmental, social, and governance dimensions. Furthermore, it proposes a hierarchical indicator system and discusses methodologies for determining indicator weights. This framework not only serves as a diagnostic tool for journals pursuing green transformation, academic equity, and governance optimization but also offers theoretical insights and practical pathways for the sustainable development of the academic publishing ecosystem.

KEYWORDS

ESG framework; Scientific journals; Evaluation system; Sustainable development

1 Introduction

Scientific journals, as the core carriers of academic communication, are indispensable for disseminating knowledge and fostering innovation. However, traditional evaluation systems predominantly focus on academic impact, relying heavily on metrics like the Impact Factor and citation counts. This narrow approach largely overlooks critical dimensions such as the environmental impact, social value, and governance efficacy inherent in the publishing process, thereby failing to capture the holistic value and societal influence of journals ^[1].

Amid increasing global emphasis on sustainable development, the Environmental, Social, and Governance (ESG) framework, formally introduced by the United Nations Global Compact in 2004, has become a vital tool for assessing sustainable development capabilities across industries ^[2-3]. Against this backdrop, integrating the ESG framework into scientific journal evaluation represents a timely and significant pathway to steer the industry toward greener, fairer, and more efficient practices.

This study aims to explore the convergence between the ESG framework and scientific journal publishing. It seeks to construct a theoretical ESG-based evaluation framework and select scientific, representative, and operable indicators. The ultimate goal is to provide a foundation for comprehensively assessing the integrated value and social contribution of scientific journals, thereby supporting the industry's transition to low-carbon and sustainable development.

2 The Guidance of the ESG Framework for Scientific Journal Publishing

The ESG framework, centered on sustainable development, provides critical guidance for transforming scientific journal publishing beyond its traditional focus. Its integration empowers journals to enhance their comprehensive value and contribute to a sustainable academic ecosystem.

2.1 Environmental Dimension

The traditional publishing model, heavily reliant on paper printing, imposes significant environmental burdens through resource consumption and pollutant emissions. The ESG framework guides journals toward green transformation by advocating for practices such as using FSC-certified paper, adopting digital publishing to reduce paper consumption, and employing eco-friendly inks and printing technologies to mitigate pollution. Furthermore, it encourages optimizing the energy efficiency of digital platforms—through measures like efficient data centers and intelligent cooling systems—to reduce the carbon footprint of publishing operations.

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2.2 Social Dimension

The social value of journals is amplified through the ESG framework's emphasis on equity and inclusion. It promotes removing barriers to knowledge by supporting open access models, thereby ensuring broader dissemination of research and equitable participation for researchers globally. The framework also encourages journals to uphold fairness and transparency in peer review, prioritizing academic merit over author background. Additionally, it underscores the role of journals in serving society beyond academia, advocating for science popularization and public engagement to translate research into wider social benefits.

2.3 Governance Dimension

A robust governance structure is essential for journal sustainability. The ESG framework standardizes operations by promoting the adoption of digital manuscript management systems to enhance transparency and efficiency in the submission-to-publication workflow. It also necessitates the establishment of comprehensive risk management protocols to address academic misconduct, copyright issues, and data security. By fostering diverse editorial boards and clear ethical policies, the framework strengthens decision-making inclusivity and institutional credibility, laying a solid foundation for long-term development.

3 Theoretical Framework of the ESG-based Evaluation System

This section delineates the theoretical underpinnings, construction principles, and overarching structure of the proposed ESG-based evaluation system for scientific journal publishing. The framework is designed to transcend traditional metrics by integrating environmental, social, and governance dimensions, thereby providing a holistic assessment tool aligned with sustainable development goals.

3.1 Theoretical Basis

The application of the ESG framework, originally prevalent in corporate sustainability and investment, to scientific journal evaluation represents an innovative adaptation to the academic publishing context ^[4-5]. This integration offers a novel perspective: the environmental dimension addresses the ecological footprint of publishing activities; the social dimension emphasizes responsibilities to the academic community and the public; and the governance dimension focuses on transparency, ethics, and decision-making mechanisms. Together, these dimensions form a comprehensive evaluation system that moves beyond mere academic impact. The theoretical foundation of this system is further supported by the principles of sustainable development and systems theory. Sustainable development theory mandates a balance between environmental stewardship, social equity, and sound governance. Simultaneously, systems theory underscores the interconnectedness of the three ESG dimensions; they are not isolated but interact dynamically. For instance, green publishing initiatives may require robust governance for effective implementation, while open-access policies can have indirect environmental implications. Therefore, the system design must account for these synergistic relationships holistically.

3.2 Construction Principles

The construction of the evaluation system adheres to a set of core principles to ensure its scientific validity and practical utility. The principle of comprehensiveness forms the basis, requiring the system to fully capture the performance of journal publishing across all three ESG dimensions, thereby avoiding the pitfall of emphasizing one aspect over others. Furthermore, the scientific principle demands that the system design be grounded in objective evidence and verifiable data, with indicator selection supported by established theory and evaluation methods being repeatable to guarantee credibility. To bridge theory and practice, the practicality principle emphasizes operational feasibility, necessitating that the system is adaptable to different types of journals and publishing environments, with indicators that are cost-effective to collect and analyze. Finally, the dynamic principle requires the system to remain responsive to technological progress and industry transformations, allowing for timely updates to indicators and weights to maintain its long-term relevance and applicability. These four principles—comprehensiveness, scientificity, practicality, and dynamism—are mutually reinforcing, collectively ensuring the evaluation system provides robust guidance for the sustainable development of academic publishing.

3.3 Framework Structure

The framework structure of the ESG-based evaluation system is organized around three primary dimensions, which directly determine its comprehensiveness and logical coherence. The environmental dimension primarily focuses on the ecological impact of the publishing process, assessing whether journals adopt green strategies to promote a low-carbon and sustainable model. The social dimension emphasizes the societal value and influence of journals, centering on their responsibilities and contributions to the academic community and the wider public; this includes commitments to open access policies, attention to the diversity of authors and readers, and active participation in science popularization. Complementing these, the governance dimension scrutinizes the normativity and transparency of journal operations, encompassing the fairness and openness of editorial and review processes, adherence to international publishing ethics, and the rationality of the management structure. It is critical to recognize that these three dimensions are not isolated but are interrelated and mutually reinforcing^[6]. Consequently, the framework integrates them into an organic whole, where the environmental, social, and governance aspects collectively serve the overarching goal of sustainable academic publishing.

4 Construction of the Evaluation Index System for Scientific Journal Publishing from the ESG Perspective

The development of a robust evaluation index system is pivotal for operationalizing the ESG framework within scientific journal publishing. This study constructs a hierarchical system designed to translate the theoretical dimensions of ESG into measurable, actionable criteria. By moving beyond traditional bibliometric focus, this system provides a practical tool for comprehensively assessing the holistic value and sustainability performance of journals, thereby offering a diagnostic mechanism for continuous improvement.

4.1 Index Design for the Environmental Dimension

The index design for the environmental dimension is critical for systematically assessing the ecological footprint of publishing activities and steering the industry towards a more sustainable trajectory. This dimension fundamentally addresses the need to balance the dissemination of knowledge with environmental responsibility. Its framework is structured around three core assessment areas, each with specific, quantifiable indicators. The first area, resource utilization efficiency, targets the sustainable management of raw materials, employing metrics such as the proportion of certified paper used and the paper consumption per unit of publication. These indicators directly reflect the journal's commitment to reducing its pressure on natural resources. The second area focuses on ecological impact control, which aims to minimize pollution and waste throughout the publishing process. This is evaluated through the proportion of low-pollution printing and the waste recycling rate, encouraging the adoption of cleaner technologies and circular economy practices. Finally, the area of energy consumption optimization gauges the efficiency of energy use and the integration of green solutions, measured by indicators like energy consumption per publication unit, the proportion of clean energy application, and the digital distribution coverage rate. Collectively, these indicators, grounded in verifiable data from procurement, operational, and distribution records, provide a comprehensive picture of a journal's environmental stewardship.

4.2 Index Design for the Social Dimension

The social dimension index design seeks to quantify the societal impact and ethical commitments of scientific journals, emphasizing their role as agents of knowledge equity and public engagement. This dimension evaluates how publishing activities contribute to building an inclusive and socially responsible academic ecosystem. The assessment framework is built upon three interconnected pillars. The first pillar, open knowledge dissemination, examines the journal's efforts to remove barriers to information access. This is primarily measured by the proportion of open access articles and the multilingual publishing coverage rate, which collectively determine the breadth and inclusivity of its readership. The second pillar, diverse and fair participation, assesses the journal's commitment to equity in the academic process. Key indicators here include the geographical coverage rate of authors, which reflects diversity in scholarly contribution, and the journal's participation in social responsibility activities, demonstrating its engagement with wider societal issues. The third pillar, industry responsibility collaboration, evaluates the journal's proactive role in strengthening the publishing community. This is captured by the proportion of cross-institutional cooperation and its contribution to the development of industry standards, highlighting its leadership and collaborative spirit within the academic field.

4.3 Index Design for the Governance Dimension

The governance dimension is foundational to the sustainable development of scientific journals, as it underpins the integrity, transparency, and long-term viability of their operations. Effective governance mechanisms are essential for maintaining academic quality, earning stakeholder trust, and navigating complex challenges. The index design for this dimension is refined into three critical aspects that reflect established principles of organizational governance. The first aspect, decision-making transparency and norms, scrutinizes the openness and regularity of editorial processes. It is evaluated through the openness of editorial board composition and the transparency of the peer review process, ensuring accountability and fairness. The second aspect, ethical behavior constraints, focuses on the mechanisms for upholding academic integrity. This is assessed by the completeness of formally articulated ethical policies and the efficiency with which the journal handles allegations of unethical behavior, which are crucial for safeguarding research credibility. The third aspect, management efficiency improvement, measures the effectiveness of internal operations and resource allocation. Indicators such as the optimization of the internal management process—often reflected in manuscript handling times—and the rationality of resource allocation, determined from operational reports, are used to gauge whether the governance structure supports operational excellence and strategic sustainability.

Table 1 Evaluation Index System for the Publishing of Scientific Journals Based on ESG

Primary Indicators	Secondary Indicators	Tertiary Indicators
Environment Dimension Indicators	Resource Utilization Indicators	Proportion of certified paper used Paper consumption per unit of publication
	Ecological Impact Indicators	Proportion of low-pollution printing Waste recycling rate
	Energy Consumption Indicators	Energy consumption per unit of publication Proportion of clean energy application Digital distribution coverage rate
	Open Knowledge Dissemination Indicators	Proportion of Open Access Multilingual publishing coverage rate
Social Dimension Indicators	Diverse and Fair Participation Indicators	Geographical coverage rate Participation in social responsibility activities
	Industry Responsibility Collaboration Indicators	Proportion of cross-institutional cooperation Contribution to industry standards
	Decision-Making Transparency and Norms Indicators	Openness of the editorial board composition Transparency of the peer review process
Governance Dimension Indicators	Ethical Behavior Indicators	Completeness of ethical policy formulation Efficiency of handling unethical behaviors
	Management Efficiency Indicators	Optimization of the internal management process Rationality of resource allocation

4.4 A Discussion on Indicator Weighting Methodology

The proposed multi-dimensional index system establishes a comprehensive evaluation framework; however, its practical application necessitates a scientifically-grounded approach to weighting the various indicators. The assignment of weights is a critical step, as it directly influences the final assessment results and reflects the relative importance of each dimension and indicator within the ESG framework.

Given that the environmental, social, and governance dimensions may hold different significance for journals across diverse disciplines and with varying strategic goals, a one-size-fits-all weighting scheme is impractical. To enhance the system's adaptability and objectivity, we propose that future applications employ a combination of subjective and objective weighting methods.

Subjective methods, such as the Analytic Hierarchy Process (AHP) or expert survey methods, can be utilized to incorporate the insights and judgments of publishing professionals, editors, and sustainability experts. This approach ensures that the weighting aligns with industry-specific priorities and values. Conversely, objective methods, such as the entropy weight method, can determine weights based on the variation degree of the actual data collected for each indicator. Indicators with greater data variability would receive higher weights, as they are considered to have a stronger discriminative power among different journals.

A more robust strategy would involve combining these approaches to form an integrated weight, thereby mitigating the biases inherent in purely subjective or objective methods. This discussion on weighting methodology underscores that the proposed index system is a dynamic and flexible tool. The specific weights can be calibrated based on the assessment context and data availability, laying a necessary foundation for the system's future empirical application and refinement.

5 Conclusion

In the context of heightened focus on global sustainable development goals, the ESG framework offers a novel perspective for evaluating and developing scientific journals. The multidimensional evaluation index system proposed in this study is designed to serve as a systematic and scientific analytical tool for this purpose. By structuring a multi-level framework around the environmental, social, and governance dimensions, the system aims to comprehensively measure journal performance in resource efficiency, academic inclusiveness, and management standardization.

The application of this index system is versatile. It can function as an internal diagnostic tool for journals to identify weaknesses and formulate targeted optimization strategies. Simultaneously, it provides a valuable reference for publishers and industry associations in establishing benchmarks and informing policy, thereby fostering the healthy development of the entire academic publishing ecosystem.

It is important to note that while the index system and the discussion on weighting methodologies strive for comprehensiveness, the system's generalizability and the practical determination of weights require further empirical validation and application in specific contexts. Therefore, future research should focus on applying and validating this framework, including the implementation of the proposed weighting methodologies, to enhance the system's practical applicability and scientific rigor.

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