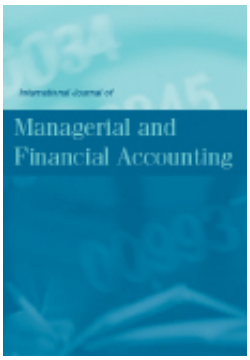

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Bibliometric insights into green accounting research: analysing trends, impact, and theoretical foundations

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Bibliometric insights into green accounting research: analysing trends, impact, and theoretical foundations

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Abstract: Global environmental challenges, including climate change, water shortages, and biodiversity loss, pose significant risks to both society and ecosystems. Green accounting provides a comprehensive approach to promoting sustainability across economic, environmental, and social dimensions. However, a unified theoretical framework for green accounting research remains undeveloped. This study systematically analysed 833 articles from the Scopus database to address this gap. A refined framework for environmental responsibility and sustainable accounting was developed to enhance existing theories. The analysis highlights strong connections among green accounting research trends, identifies key areas and emerging topics, and confirms widely accepted methodologies. Additionally, the findings validate the bibliometric analysis within the constructed framework. This study offers a solid theoretical foundation for advancing green accounting theory, encouraging methodological innovation, and improving practical applications. By strengthening its theoretical basis, green accounting can play a crucial role in shaping sustainable business practices and policy development.

Keywords: bibliometric analysis; green accounting; sustainable development; environmental challenges; theoretical framework.

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1 Introduction

The Industrial Revolution of the 19th century led to widespread environmental pollution and the overexploitation of natural resources. Green accounting, a branch of accounting also known as 'environmental accounting' or 'resource accounting,' aims to capture and monitor the economic impact of environmental activities. The link between literature analyses and theoretical frameworks in green accounting lies in their shared goal of understanding and quantifying the environmental impacts of economic activities. Therefore, consistency between these elements is crucial for validating the practice of green accounting.

In 1981, as a pioneer in natural resource accounting, Norway issued a report titled 'Natural Resource Accounting' outlining strategic directions and policy measures for the sustainable use of natural resources. Subsequently, Finland established the national natural resource accounts (NRA) to provide detailed information on resource management. The concept of green accounting gained international attention in the late 1980s and early 1990s, with countries encouraging corporate environmental reporting through legislation and initiatives. The 1992 Earth Summit in Rio de Janeiro brought global environmental issues to the forefront, with the adoption of the Rio Declaration and the Rio Framework Convention on Climate Change. This introduced the concept of sustainable development and provided the rise of green accounting with political and legal support. The United Nations Statistical Commission released a preliminary draft of the System of Integrated Environmental and Economic Accounting (SEEA) in 1993. In 1997, the concept of 'green GDP' was introduced to measure the degree of harmony between economic growth and environmental protection.

The theoretical foundations of green accounting are also closely linked to its historical development, with key concepts and frameworks originating in early academic research. The concept of internalising the social costs of pollution control was first introduced by Beams and Fertig in 1971, laying the foundation for the theoretical construction of green accounting. Subsequently, the concept of 'sustainable value', put forward by Hart and Paul in 1995, further expanded this theory, emphasising the long-term sustainable development of enterprises by solving social and environmental problems. Since 2014, the global sustainability reporting system has been gradually

clarified and expanded. The European Union (EU) was the first to issue Directive 2014/95/EU, the non-financial reporting directive (NFRD). This mandates the disclosure of ESG information by large enterprises (with more than 500 employees), while small enterprises follow the principle of voluntary disclosure, a move that laid a solid foundation for the subsequent development of sustainability reporting (Pozzoli et al., 2023). The adoption of the European Sustainability Reporting Standard (ESRS) by the European Commission in 2023 marks a significant step towards integrating sustainability into the EU economy. The ESRS consists of 13 criteria covering three dimensions (environmental, social, and governance). It is aligned with several EU regulations, such as SFDR, EU Classification Standard, and international best practices, like GRI, CDP, and TCFD (Opferkuch et al., 2021). Meanwhile, the international sustainability standards board (ISSB) of the International Accounting Standards Board (IASB) developed the International Financial Reporting Standards (IFRS-S1 and IFRS-S2). These examine the relationship between a company's financial performance and changes in external environmental dynamics, as well as the potential operational risks. Building on the previous initiatives, the active participation of the European Financial Reporting Advisory Group (EFRAG) has further promoted synergies between the Corporate Sustainability Reporting Standard (ESRS) and International Financial Reporting Standards (IFRS), which is essential for the construction of a harmonised and coherent global sustainability reporting framework.

Finally, as reporting requirements become more stringent and data collection increasingly complex, it is essential for companies to adopt digital tagging in their sustainability reports. This innovation will significantly enhance the accessibility, accuracy, and analysis of sustainability data, ultimately empowering organisations to make informed decisions and meaningfully contribute to environmental stewardship.

Within this context, this study highlights the significance and reliability of established methodologies in green accounting through comprehensive bibliometric analysis. It also examines the relationship between research trends and theoretical frameworks, providing valuable insights into current knowledge gaps and paving the way for methodological advancements and practical applications in sustainable reporting. This study also demonstrates that, while existing literature has extensively studied green accounting practices in developed countries, there is limited research on the unique challenges and opportunities faced by developing nations. For instance, although emerging countries like China have the highest number of publications, many developing nations remain underrepresented despite facing critical environmental challenges. This study identifies these regional disparities and emphasises the need for comparative analyses to address them. Lastly, the study identifies future research directions for further exploration and expansion.

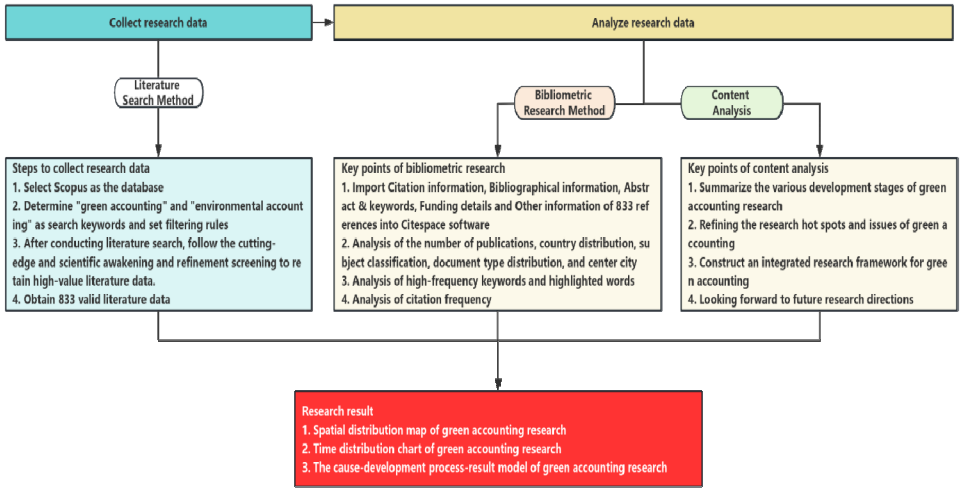
2 Sample and research methodology

In this study, CiteSpace will be used with traditional bibliometric analysis methods to visualise and analyse literature related to green accounting, and provide a comprehensive examination of factors such as annual publication volume, research hotspots, and research trends. Bibliometric analysis enables the systematic examination of a large volume of green accounting literature (883 articles) to identify key research areas, emerging topics, and influential contributors (Donthu et al., 2021). CiteSpace is a

software tool designed to visually analyse academic literature, and includes features such as automatic keyword extraction, co-citation relationship analysis, and temporal and geospatial analysis.

The research process is divided into two main steps: data collection and data analysis. In the first step, literature search methods are primarily used to gather data. For data analysis, a bibliometric approach is employed to quantitatively evaluate the findings. This includes an examination of keyword contributions and salient terms to identify the evolutionary stages, developmental paths, and characteristics of green accounting research. Additionally, an analysis of publication volume and centrality (or citation frequency) was carried out, to help map the spatial distribution of green accounting research. This analysis identifies the distribution of countries, institutions, journals and authors in the field and assesses the network characteristics and status of scientific collaborations. A content research methodology was employed for in-depth qualitative analysis of the literature, to identify five key research focus areas in green accounting. This approach involved analysing co-citation counts and conducting content analysis to explore current issues in prominent research hot spots. Based on the content analysis, a comprehensive model has been developed representing the antecedents, processes, and outcomes of green accounting along its evolutionary trajectory. The findings were then interpreted in the context of relevant theories. This study analyses the trajectory and key issues in green accounting research, identifying gaps in the existing landscape and suggesting future research directions for further exploration and development. The research process and methodological framework of this study are illustrated in Figure 1.

Figure 1 Research process and research methodology of this study (see online version for colours)

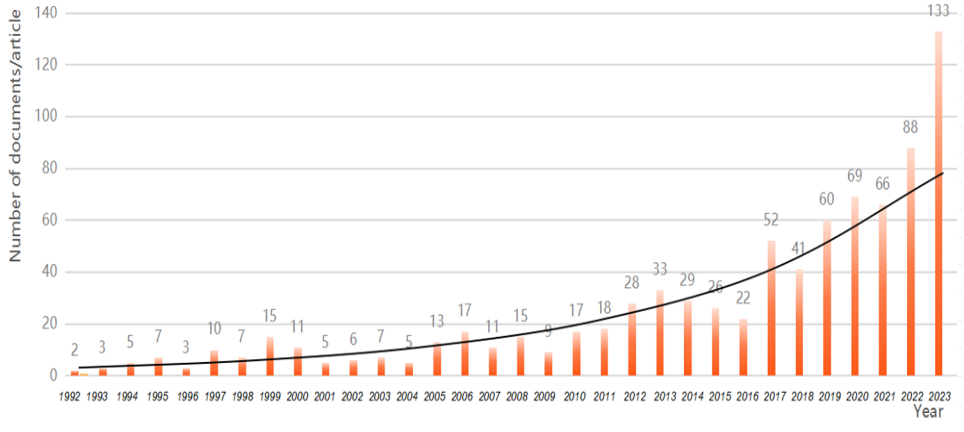


3 Bibliometric research results

3.1 Chronological distribution of green accounting research: an analysis of evolutionary context, overall characteristics, and stages of development

The distribution of the year of publication directly reflects the development of green accounting research. Figure 2 shows the number of green accounting research papers published each year since 1992. The data show a gradual upward trend. The number of green accounting research papers shows a more obvious positive correlation with the global emphasis on environmental issues, indicating that green accounting has been increasingly emphasised in economic management disciplines. The sample is divided into three intervals, each marked by a peak in the number of published papers: 1999 (1992–2004), 2013 (2005–2016), and 2023 (2017–2023). Very few papers on green accounting research appeared before 1998. In 1999, a more pronounced peak emerged, coinciding with the adoption of the Kyoto Protocol – a subsidiary agreement of the United Nations Framework Convention on Climate Change (UNFCCC) aimed at reducing greenhouse gas emissions. In 1999, EU member states, the USA, Japan, and other developed countries, also formulated a series of relevant policies and regulations in the areas of air quality, water resource management, and biodiversity preservation. These, to a certain extent, increased the popularity of green accounting. During the 12-year period from 2005 to 2016, the number of papers published showed a 'steady' growth.

Figure 2 Trends in the number of global green accounting research papers (1992–2023) (see online version for colours)



Notably, between 2017 and 2023, literature on green accounting research experienced a 'wave-like' upward trend, with a significant increase in the overall number of published papers compared to the average annual output from 1992 to 2016. In 2023, publications peaked at 133 papers.

3.2 Spatial distribution of green accounting research

To understand which countries, institutions, journals, and authors play a leading role in the field of green accounting research, we analysed the data by Scopus literature

classification. As shown in Table 1, this analysis identifies the most important contributors in these categories. It reveals research trends and hot spots in the field, highlights current issues in green accounting, and identifies research directions. This information helps to predict and analyse future developments.

Table 1 Key countries, institutions and authors of green accounting research

Ranking	*Country (quantity)*	*Research Institute (quantity)*	*First author (quantity)*	*Journals (quantity)*
1	China (163)	Chinese Academy of Sciences (12)	Tsai, W. H. (8)	*Journal of Cleaner Production (28)*
2	USA (120)	National Central University (10)	Atkinson, G (7)	*Ecological Economics (26)*
3	UK (78)	Bina Nusantara University (10)	Bartelmus, P (6)	*Sustainability Switzerland (20)*
4	Italy (48)	McGill University (7)	Markandya, A (5)	*International Journal of Energy Economics and Policy (10)*
5	India (41)	Ministry of Education of the People's Republic of China (6)	Aronsson, T (4)	*IOP Conference Series Earth and Environmental Science (8)*
6	Canada (38)	Umea Universitet (6)	Cairns, R. D. (4)	*Business Strategy and The Environment (6)*
7	Germany (38)	Bucharest University of Economic Studies (6)	Caraiani, C. (4)	*Chinese Journal of Eco Agriculture (6)*
8	Indonesia(37)	Harbin Institute of Technology (5)	Giannetti, B.F. (4)	*Critical Perspectives on Accounting (6)*
9	Australia (28)	University College London (5)	Hamilton, K. (4)	*Environmental Science and Pollution Research (6)*
10	Russian Federation (26)	Lancaster University (5)	Löfgren, K.G. (4)	*Sustainability Accounting Management and Policy Journal (6)*

The results indicate that China leads green accounting research with the highest number of publications, totalling 163 papers. This focus reflects the country's emphasis on sustainable development, environmental protection, and strong support for green economy initiatives and technology. Following China, the USA (120 articles) and the UK (78 articles) have the next highest number of green accounting publications. This prominence underscores the robust support for environmental protection and sustainable development from both government and private sectors in these countries, driving numerous research projects and academic contributions. The involvement of various countries highlights the global significance of green accounting. China, the U.S., and the UK concentrate on different aspects of green accounting, influenced by their respective economic development, regulatory environments, and industrial structures.

The 'Research Institutions' column highlights the leading institutions in green accounting research by their publication output: the Chinese Academy of Sciences (CAS)

(12 papers), National Central University (10 papers), and University of Bina Nusantara (10 papers). As the premier academic institution in China's science and technology sector, the CAS is at the forefront of green accounting research, reflecting the Chinese government's commitment to green development and environmental protection. The papers primarily focus on developing and applying green accounting to evaluate the environmental performance of enterprises and regions using indicators like green GDP. They also assess progress in green economy and sustainable development. The CAS emphasises creating a systematic green GDP evaluation system to accurately reflect environmental performance and develop methods for data collection and disclosure, to provide stakeholders with transparent information. National Central University conducts empirical research on green accounting, business performance, and environmental impact assessment, optimising production decisions and improving resource efficiency through activity-based costing, mathematical programming, environmental policies, and carbon taxes. Meanwhile, Bina Nusantara University explores green accounting practices in Indonesia, emphasising corporate social responsibility and sustainability performance, and how these influence firms' financial outcomes and valuation.

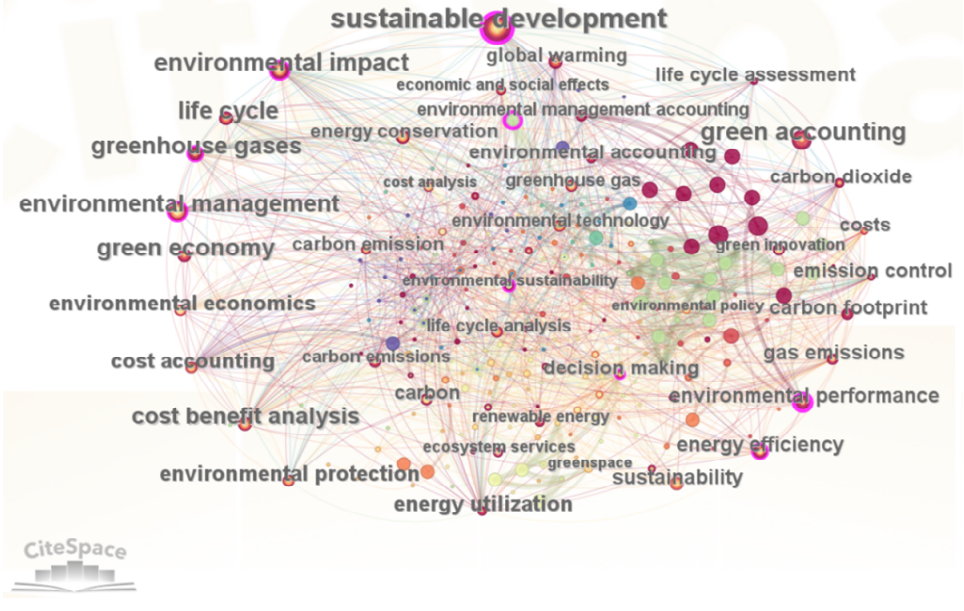
The 'First Author' column highlights the core authors in green accounting research and their collaborative networks, showcasing three main research groups. The first group, led by Atkinson G., focuses on green accounting and sustainable development. The second group, headed by Aronsson T., concentrates on green accounting and environmental economics. The third group, led by Cairns R.D., emphasises green accounting and ecosystem valuation. Atkinson G. and Hamilton K. from the London School of Economics and Political Science have collaborated on environmental resource accounting methodologies, the valuation of environmental services, economic analyses, and the development of a green national accounting framework. Notably, Atkinson's team explored incorporating environmental resource values into accounting systems, and proposed a methodology for measuring ecological savings, significantly impacting green accounting research. Researchers Löfgren K.G. and Weitzman M.L., part of Aronsson T.'s team at the University of Meaux, examine how green accounting influences welfare measurement and sustainability. Aronsson and Löfgren (1998) suggests that incorporating labour efficiency and technological progress into neoclassical growth models enhances the understanding of economic growth and welfare measurement, improving forecasting and policy recommendations. Giannetti B.F.'s team at Paulista University developed a framework addressing issues in ecosystem services accounting, such as uncertainty and double counting. They propose a contingency-based approach that categorises services into direct, indirect, and existing categories (Shah et al., 2019). Finally, Cairns R.D., of McGill University, has contributed to green accounting by applying it to the commercial valuation of forests. He emphasises incorporating non-market values into green adjustments, suggesting that a green NNP may require estimating non-market imports and exports (Cairns, 2001).

As shown in the 'journals' column, the *Journal of Cleaner Production* has the highest number of published papers in green accounting research and the highest citation frequency. Journals such as *Ecological Economics*, *Sustainability Switzerland*, and the *International Journal of Energy Economics and Policy* also emphasise green accounting. This underscores the significance of green accounting within the realms of ecological economics, sustainable development, and energy policy. It highlights the crucial role of green accounting in addressing environmental challenges, promoting sustainable development, and exploring innovative energy economic models.

3.3 An analysis of green accounting research hot spots

To further clarify the characteristics of green accounting at different stages, this study adopts keyword co-occurrence mapping analysis. Keywords with higher frequency at each stage can be regarded as research hot spots. This method was then used to analyse the various research hot spots and development trends within the field of green accounting at each stage. Using Gephi, a software tool, we set the thresholds as Top N = 50 and Top N% = 10. After extracting keywords from the data, we obtained a co-occurrence network containing 275 keyword nodes and 1,433 connecting lines, resulting in a network density of 0.038. In Figure 3, the nodes represent the keywords, with larger dots indicating higher frequencies. The connections and thickness between the dots illustrate the co-occurrence relationships and the strength of associations among the keywords. As seen in the diagram, the network of co-words radiates from a centre point of 'sustainable development'. This indicates that the main research object of green accounting is sustainable development, which covers a variety of fields such as environmental impact, green economy, cost-benefit analysis (CBA), etc.

Figure 3 Covariance of keywords in green accounting research (see online version for colours)



The frequency and centrality ranking of keywords are shown in Table 2. The top three keywords are 'sustainable development', 'environmental impact' and 'green accounting', which indicates that 'sustainable development' occupies an important position in the field. In addition, 'sustainable development' has the highest frequency and centrality, indicating that it connects to different hot spots in the field of green accounting and is closely related to several topics.

Table 2 Distribution of co-occurrence of the first three keywords in green accounting research from 1992 to 2023

	Count	*Centrality*	*Year*	*Keywords*
1	115	0.22	1994	Sustainable development
2	74	0.10	1995	Environmental impact
3	63	0.07	1994	Green Accounting

Finally, we selected the top 30 most frequently co-cited keywords between 1992 and 2023. Table 3 displays the high-frequency keywords for each stage in the evolution of green accounting.

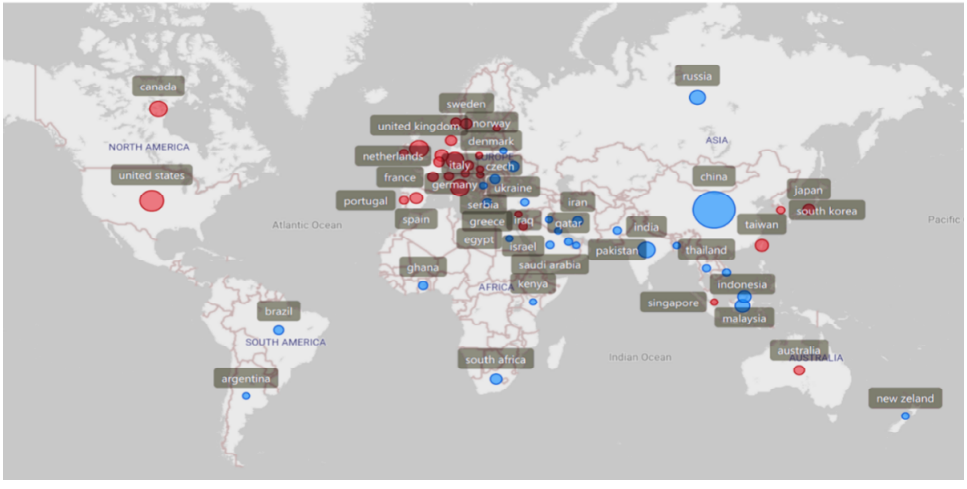
Table 3 Distribution of co-occurrence of 30 green accounting research keywords from 1992 to 2023

Evolution path	*Keywords (frequency)*
Before 1992	Green accounting theory (6), accounting framework (1), conceptual framework (1), benefit cost models (1), income accounting (1)
1993-2004	Sustainable development (115), environmental impact (74), green accounting (63), cost accounting(59), environmental economics (55), cost benefit analysis (39), environmental protection (36), environmental accounting (26), environmental performance (26), sustainability (25), decision making (20), carbon emissions (14), environmental policy (10), manufacture (8), accountability (7), green GDP (7), green national accounts (4), methodological evaluation (2), economic welfare (2), accounting framework (1), accounting method (1), income accounting (1), national income (1), environmental purchasing guideline (1), asphalt pavements (1), chemical pulp (1), coated base paper (1), conceptual framework (1), benefit cost models (1), business (1)
2005–2016	Life cycle (47), greenhouse gases (43), carbon dioxide (24), gas emissions (21), costs (20), energy conservation (17), global warming (16), natural capital (8), air pollution (7), agriculture (6), green accounting talent (4), accounting methods (3), air pollution control (2), computer programming (2), green engineering (2), national economy (2), environmental engineering (2), international trade (2), contingent valuation (2), environmental cost (2), anthropogenic effect (1), abatement costs (1), balance of trade (1), coupled flows (1), accounting research (1), building sustainability information (1), agriculture environmental policy (1), accounting model (1), carbon accounting (1)
2017-present	Environmental management (48), energy efficiency (28), green economy (28), energy utilisation (27), carbon footprint (26), life cycle assessment (20), emission control (18), carbon emission (12), greenhouse gas (12), environmental management accounting (11), life cycle analysis (9), green innovation (9), environmental cost analysis (8), supply chain management (8), environmental benefits (7), environmental sustainability (7), circular economy (7), economic growth (7), economic and social effects (7), corporate social responsibility (6), greenhouse gas emissions (5), alternative energy (5), environmental management practices (5), environmental accounting (5), environmental pollution (4), waste management (4), green finance (4), accounting system (3), energy policy (3), environmental regulations (2)

3.4 A comparison of research focusses in developing and developed countries

Moreover, we categorised the articles based on the study's sample into two groups: developed and developing countries. For better comparison, we include emerging countries like China and Russia under the developing category. Our classification follows the report by the IMF (2011). Figure 4 illustrates the number of published articles per country, where the size of the bubbles corresponds to the volume of publications - larger bubbles represent a greater number of articles. Blue circles indicate emerging or developing countries, while red circles represent developed countries.

Figure 4 Number of published articles per country (see online version for colours)



Our analysis reveals that 55.19% of the published articles are associated with emerging or developing countries, with China, India, and Russia leading publication numbers. In contrast, 44.80% of the published articles come from developed countries, with the USA, the UK, and Italy contributing the most. This finding underscores the growing research activity in emerging economies, reflecting their increasing engagement in addressing environmental challenges. This pattern highlights the differing research priorities shaped by various levels of development, policy contexts, and resource dependencies. A comparison of the focus between developing and developed countries in green accounting research reveals these distinctions. The 13 most significant keywords of interest to both developed and developing countries are presented in Table 4.

In both groups, 'sustainable development' remains the most frequently discussed theme (81 mentions in developing countries, 65 in developed countries). This reflects the shared global priority of achieving economic progress without compromising the needs of future generations. However, the underlying drivers and policy frameworks for achieving this goal vary across contexts. In developing countries, 'environmental protection' ranks second (57 mentions), while in developed countries, the focus shifts toward 'environmental impact' (38 mentions). This distinction suggests that developing nations are often engaged in foundational discussions about conservation and resource preservation (e.g., biodiversity and resource depletion). Meanwhile, developed nations concentrate more on quantifying and evaluating the effects of existing industrial or

societal activities. Additionally, 'green accounting' ranks higher for developed countries, highlighting a strong emphasis on accountability practices, environmental cost analysis, and comprehensive reporting frameworks.

Table 4 Distinctive priorities in developed and developing/emerging countries

Frequency	*Developing*	*Frequency*	*Developed*	*Rank*
81	Sustainable development	65	Sustainable development	1
57	Environmental protection	38	Environmental impact	2
31	Environmental economics	35	Environmental economics	3
28	Sustainability	32	Green accounting	4
24	Conservation of natural resources	23	Climate change	5
24	Economic development	21	Conservation of natural resources	6
21	Human capital	21	Carbon dioxide	7
21	Water footprint	21	Environmental policy	8
21	Environmental impact	16	Natural capital	9
16	Green GDP	14	Human capital	10
12	Green accounting	13	Cost accounting	11
11	Ecosystem service	10	Renewable energy	12
10	Cost accounting	9	Cost benefit analysis	13

3.5 The evolutionary path of green accounting and the characteristics of each stage

According to Figure 2 and Table 3, the nascent stage of green accounting (before 1992) saw the initial emergence of green accounting theories. At this time, the theoretical framework had not yet been fully developed, and green accounting had not become a mainstream research area. The most frequently occurring keyword was 'green accounting theory,' reflecting early exploration of the concept. From 1993 to 2004, theoretical exploration and initial practice characterised the development of green accounting. During this period, key concepts such as green accounting, sustainable development, and environmental economics gained prominence, leading to active study and discussion. While the foundational framework for green accounting gradually improved, its practical application remained relatively limited. Between 2005 and 2016, as the theory deepened and applications expanded, the concept of green accounting evolved and became more widely practiced. High-frequency keywords like life cycle assessment, greenhouse gas emissions, and energy efficiency indicate a strengthening of theoretical and methodological research and broader practical applications. From 2017 to the present, green accounting has achieved widespread recognition and application. It has garnered significant research attention in specialised fields such as ecological economics, environmental management, and environmental sustainability. The increase in research focused on green accounting within heavily polluting industries such as coal, steel, and batik, underscores its growing importance in business and government management.

Table 5 Grouping of hot topics in green accounting research

Number	*Number of nodes*	*Silhouette*	*Cluster name*	*Keywords (part)*
0	49	0.675	Sustainable cost assessment	Life cycle assessment, cost analysis, environmental accounting, activity-based costing
1	45	0.776	Green accounting and management	Environmental performance, green accounting, environmental accounting, environmental management accounting, green innovation
2	38	0.783	Environmental cost and benefit analysis	Activity-based costing, mathematical programming, carbon emissions, water footprint, sustainability
3	35	0.904	Green supply chain and decision management	Decision-making, supply chain management, green supply chain management, urban planning, green space
4	31	0.79	Green economy and environmental accounting	Air pollution, green GDP, Denmark, economic growth, green growth
5	23	0.889	Green infrastructure and environmental cost management	Green infrastructure, stormwater management, green roofs, environmental costs, water resources management
6	17	0.985	Environmental management and corporate sustainable development practices	Environmental management practices, hospitality, green ideals, management control systems, green hotel
7	13	0.878	Green accounting and environmental performance assessment	Accounting methods, economic and social effects, environmental pollution, accounting system, green supply chain
8	8	0.959	Green accounting methods and environmental risk assessment	Potential ecological risks, heavy metal pollution, evaluation of soil environmental quality, discounted cash flow analysis, peri-urban farming

3.6 Popular research topics in green accounting

To comprehensively analyse the research topics and directions in green accounting, we used the log-likelihood method. Specifically, the LLR algorithm in the K-clustering function, to cluster keywords from 833 green accounting research articles and generate a clustering network diagram. The significance and effects of clustering in green accounting research are tested by the module value Q and the average profile value S on

the graph. A Q value of 0.4877 (greater than 0.3) indicates a significant clustering structure. An S value of 0.8115 (greater than 0.5) indicates that the clustering network has a high degree of homogeneity and a better clustering effect. By further extracting the clustering information, we obtained the name, number of nodes, proximity, and the keyword with the largest label value for each cluster. Table 5 illustrates the names of the nine clusters. Among them, the 'sustainable cost assessment' cluster has the highest number of nodes, while the 'environmental management and corporate sustainability practices' cluster has the highest proximity.

4 Development of a research framework for bibliometric studies in green accounting

4.1 An analysis of green accounting bibliometric research theory

In his book '*Environmental Accounting Research*', Ching (2013) proposes incorporating external factors theory, coordination and unification theory, and behavioural theory into the research framework and theoretical analysis of environmental accounting. This approach aims to enhance our understanding of how environmental factors influence business management, and how we can use environmental accounting information more effectively for decision-making and resource management. Given the continuous development of green accounting theories, this study integrates five key knowledge areas based on clustered information and literature: responsibility accounting theory, external factors theory, CBA, normative theory, and sustainable accounting theory. Together, these help us outline and sort the core knowledge areas of green accounting.

4.1.1 Theoretical perspective of responsibility accounting

In 1987, Johnson and Kaplan introduced the concept of responsibility accounting. Their theory emphasises that companies should prioritise both economic profit and social responsibility. However, when addressing environmental complexity, the difficulty in obtaining comprehensive and accurate data – particularly when firms value environmental externalities and non-market resources (Haab, 1969) – limits the theory's applicability. In 1992, Australian scholar Gray argued that traditional accounting overlooks the environmental impacts of business activities, as well as the influence of the natural environment on companies' financial performance. Green accounting aims to address these gaps by including resource consumption, environmental pollution, and economic growth factors in measures like GDP, making it a more comprehensive indicator of national wealth and the balance between environmental protection and economic growth (Liu and Yu, 2010). However, due to challenges in calculating environmental pollution and gathering resource consumption data, the concept of green GDP remains largely theoretical (Xiu, 2007). Similarly, Rao (2010) suggests that while environmental analysis holds valuable potential for economic policymaking, its practical application remains limited, necessitating closer integration between economics and environmental science to improve policy design. In this context, Kythreotis et al. (2024) emphasise the importance of legal origins as well. Understanding the role of legal frameworks in shaping corporate disclosures provides valuable insights into the challenges firms face when attempting to integrate environmental costs into traditional

accounting systems. This discussion is particularly relevant to green accounting, where the absence of standardised frameworks and reliable data poses significant barriers to effectively incorporating environmental factors into corporate reports. The influence of legal systems on sustainability reporting may affect how companies approach the valuation of environmental externalities, further complicating the application of green accounting principles. However, some countries are already adopting elements of green accounting. Denmark, for example, has gradually introduced a green economy model, incorporating green national accounts and green GDP into policy development (Hoff et al., 2021). Finally, in the post-COVID-19 era, economic recovery efforts have intensified the focus on natural capital, creating an opportunity to adapt fiscal subsidy programs to green policies, which could simultaneously promote economic growth and reduce unemployment (Chitiga et al., 2022).

4.1.2 External factors theory perspective

The issue of externalities and the market failures they cause is a key area of research in environmental economics. In 1920, Pigou first introduced the concept of pollution externality in his book 'Welfare Economics'. This theoretical foundation has had a profound impact on the development of environmental economics and policy making. The theory highlights the role of external environmental factors in shaping the accounting practices of firms. However, there is often a lack of specificity in operationalising these externalities within the accounting system, particularly in sectors where data is limited, such as agriculture or the informal sector. The informal economy presents significant challenges for accurate economic measurement and analysis, especially in developing countries (Ackrill and Igudia, 2023). In the agricultural sector, the complexity of accounting data collection and analysis is influenced by several factors. Agricultural enterprises face unique challenges, including seasonality, weather-related risks, and inventory valuation (Bakhishli, 1996).

Based on the externality theory, green accounting can correct market failures more effectively by internalising the externality costs arising from the negative impacts of corporate activities on the environment and society, thus providing a theoretical basis and methodology for dealing with these negative impacts. Razak et al. (2020) state that obtaining carbon credits presupposes that offset projects can reduce the concentration of greenhouse gases in the atmosphere. They also say that to achieve this goal, researchers have proposed a series of measures, including phasing out carbon-intensive fuels, implementing carbon capture and utilisation technologies, reducing energy use and improving energy efficiency. Nevertheless, the construction industry has faced challenges in implementing these measures. Woo et al. (2021) note that the industry lacks a system to accurately measure, report, and verify (MRV) energy consumption and carbon emissions. This gap has limited the promotion and application of carbon reduction measures in the sector. However, blockchain technology could provide a transparent and reliable MRV system that effectively tracks the industry's carbon footprint, promotes green transformation, and enables industry participants to engage in the carbon credit market. In addition, Sekerin et al. (2018) argued that by combining fluid dynamics (CFD) with building information modelling (BIM), a more comprehensive data assessment can be provided for the environmental impact assessment of green buildings.

4.1.3 A theoretical perspective on cost-benefit analysis

CBA was first proposed by French engineer and economist Jules in the 19th century. It guides decision-making by measuring the social benefits and costs of public works projects. In the field of green accounting, the application of CBA promotes a win-win situation for both economic and environmental benefits by quantifying environmental and social benefits. Antti (2018) points out that the existing accounting system needs to integrate environmental and social costs and achieve its goals through flexible environmental protection policies, thereby improving the relevance and reliability of the statements (Kythreotis and Soltani, 2023; Christofi et al. 2024). As an effective tool for assessing the economic consequences of various programs, CBA can help decision makers avoid decisions that adversely affect natural resources. However, the tool also faces some methodological biases and ethical criticism (Bräuer, 2003). These include challenges in quantifying intangible or long-term environmental benefits (Spiller and Deng, 2014), and the fact that it is often difficult to adequately capture environmental impacts due to data limitations and methodological constraints (Pearce, 1998; Sinden, 2019).

To more accurately assess environmental costs and benefits, Gray theory offers new methods for green GDP forecasting in Taiwan, particularly in cases of insufficient data and uncertainty (Lu and Chiu, 2012). In industrial applications, the green activity costing production planning model not only helps companies to effectively respond to environmental challenges by incorporating environmental costs into product costs but also provides innovative ideas for production planning (Tsai et al., 2019). In addition, reliability costs associated with ancillary services must be considered during renewable energy integration to fully assess the overall costs of intermittent resources and avoid underestimating their impacts (Atkinson, 2000). Furthermore, the concept of green cost of electricity (GCE) proposed by Schaltegger et al. (2006), and the establishment of an electricity costing system that includes both resource and external costs, are essential to promoting the rationalisation and sustainability of the electricity mix.

4.1.6 Normative theory perspective

The normative theory, developed in 2016 by Durkheim in his book '*The Social Division of Labour*', emphasises that societal expectations and norms regarding corporate environmental responsibility can greatly influence corporate environmental disclosure behaviour. By disclosing environmentally related information, companies can enhance their social recognition and reputation, thereby contributing to a positive corporate image (Gonzalez and Peña, 2023). Looking back at the development of green accounting, social reporting, triple bottom-line reporting, and global reporting initiatives since the 1960s, the core elements of 'financial, manufacturing, intellectual, human, social and relational, and natural capital' embedded in these frameworks are essential for ensuring sustainable development (Rimmel et al., 2018). For companies engaged in polluting activities, green accounting should be implemented to track and manage environmentally-related capital flows and to assess their impact on sustainable development. This approach also aids in selecting appropriate policy solutions for daily operations (Bartelmus, 2014). However, while some large multinational corporations publish sustainability reports, most disclosures only meet the statutory minimum standards (Okcabol and Hoffman, 2015). Consequently, the use of normative theory in green accounting has been criticised for its

reliance on voluntary compliance, which can lead to 'greenwashing' in a weak regulatory environment. Firms engage in 'greenwashing' to mitigate losses from environmental penalties and respond to external pressures (Delmas and Burbano, 2011). This behaviour is more prevalent in firms with weak internal controls, those in competitive industries, or in regions with high pollution levels (Zhou et al., 2024). Regulatory policies aimed at reducing carbon emissions can inadvertently encourage 'greenwashing,' particularly among state-owned enterprises and politically connected firms (Zhang, 2023). To address this issue, it is recommended that governments, in collaboration with relevant stakeholders, incentivise companies to collect and disclose information on sustainable business practices and environmental impacts. Effective regulation and the promotion of environmental information disclosure are crucial to curbing 'greenwashing' and its negative effects (Markham et al., 2014). Good corporate governance can directly contribute to the disclosure of more transparent environmental information, unlike financial performance, which does not necessarily influence firms' attitudes or the extent of their environmental disclosures (Zhao et al., 2020).

4.1.7 Continuity accounting theory perspective

The continuity accounting theory was first introduced in 'Accounting Theory: Continuity and Change' by Ananias and Zimmerman (1962), emphasising both continuity and change within accounting theory. Based on the theory, Meyer (1994) argued that close cooperation between international organisations is crucial for the development of green accounting, as such cooperation can facilitate improved measurement and management of sustainable resource use and promote global sustainable development. However, despite environmental protection becoming a global priority, developing countries continue to face tensions between environmental protection and economic growth. Bilgen et al. (2004) points out that energy demand is at the heart of this paradox. Sathaye and Ketoff (1991) predicted that energy demand and emissions in developing countries will grow significantly by 2025, and carbon emissions may even double. Kumar and Managi (2009) both argued that in developing countries, the relationship between environmental protection and economic growth is complex and often perceived as antagonistic to each other, which not only accelerates resource depletion and environmental degradation, but also exacerbates greenhouse gas emissions. Yankun (2024) agrees that economic expansion is usually accompanied by increased resource consumption and pollution. Slawinski and Bansal (2015) highlight that the tension between short-term benefits and long-term sustainability in resource development is a common issue across industries. They also state that organisations able to consider both short-term and long-term perspectives are more likely to recognise the complexity of sustainability challenges and develop integrated solutions. Yankun (2024) uses China's rapid industrialisation to demonstrate the challenges of finding a balance between economic development and environmental protection while pursuing economic growth. Fayomi et al. (2019) noted that industrial activities consume large quantities of water, energy, and mineral resources while generating air, water, and solid waste pollution including hazardous and toxic substances. Faced with this reality, Walter and Ugelow (1979) observed that because stringent environmental policies may inhibit economic growth in the short run, developing countries tend to prioritise socio-economic needs over environmental controls, leading to relatively lax environmental policies.

Table 6 A summary of studies on factors influencing the harmonisation of environmental and economic development

Result	*Moderator/mediator*	*Key goal*	*Focus country*	*Authors (Year)*
Green investment significantly improves corporate sustainability. The three factors all positively moderate (enhance) that relationship, implying policy support and investor awareness bolster green initiatives	Government subsidies, investor attention, executives' overseas experience	Examine how government subsidies, investor attention, and executives' overseas experience reinforce the link between green investment and corporate sustainability	Chinese listed companies (2010–2020)	Zheng and Jin (2023)
Green IT adoption positively influences sustainable MSME performance. Financial /accounting resources and green innovative behaviour do not show moderation effects	Financial and accounting resources (not significant)	Identify how green IT, green innovation, and green competitive advantage affect sustainable MSME performance; test whether financial/accounting resources moderate	Creative Batik MSMEs in Indonesia	Kusuma et al. (2023)
All three (environmental accounting, green HRM, energy efficiency) positively correlate with sustainable development. Social responsibility disclosure significantly mediates these relationships, highlighting the importance of transparent reporting	Social responsibility disclosure	Examine how environmental accounting, green HRM, and energy efficiency affect sustainable development, and whether social responsibility disclosure mediates	Manufacturing firms in Vietnam	Thuan et al. (2024)
GTL strongly and directly improves CEP and further enhances it indirectly through GPI. EMA is also linked to better CEP. Effective leadership and process innovation are crucial levers for environmental gains	Green process innovation (GPI)	Explore how environmental management accounting (EMA) and green transformational leadership (GTL) influence corporate environmental performance (CEP) via green process innovation (GPI)	Certified manufacturing firms in Pakistan	Hanif et al. (2023)
Environmental strategies positively influence both environmental performance and EMA use. Environmental proactivity strengthens (moderates) the effect	Environmental proactivity	Investigate how environmental strategies and environmental management accounting (EMA) affect environmental performance, with proactivity as a moderator	Manufacturing micro enterprises (MSMEs) in India	Chetanraj et al. (2024)
Management's proactive stance is vital for achieving sustainability	Top management's environmental awareness	Understand how environmental orientation, top management environmental awareness, and environmental performance link to green business strategy and overall SME success	Indonesian SMEs (food, leather, furniture)	Sabihaini et al. (2024)
Green accounting positively influences both energy efficiency and environmental performance. Energy efficiency partially mediates green accounting.	Energy efficiency	Examine how green accounting affects energy efficiency and environmental performance, and test partial mediation by energy efficiency	Pharmaceutical and chemical firms in Bangladesh	Rahman and Islam (2023)
Green human and structural capital directly enhance EPM use and environmental performance. Green relational capital improves performance only when EPM is a mediator. Embedding measurement systems is key to capitalising on GIC	Use of EPM (especially for green relational capital)	Examine how environmental performance measurement (EPM) mobilises green intellectual capital (GIC) for better economic and environmental outcomes	Iranian publicly listed companies	Asiaei et al. (2022)

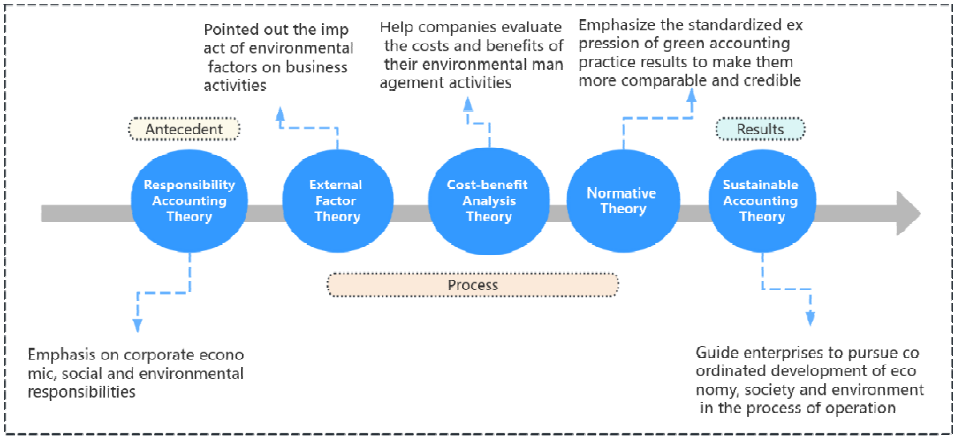
Li and Lang (2010) highlighted that China is attempting to address this issue by implementing green GDP accounting, although this contradiction remains a long-standing and dynamically-evolving problem. As green GDP gradually increases, the negative externalities of economic growth on resources and the environment are expected to diminish. To better understand and address this paradox, Table 6 shows how various factors (moderators or mediators) influence the effectiveness of green accounting, environmental strategies, and corporate sustainability in different contexts. This study investigates the changing dynamics across industries and developing countries, providing insights into how organisational and external factors contribute to environmental and economic outcomes. These insights provide a clearer picture of how environmental protection and economic growth can be balanced in practice, and how the tension between the two can be mitigated through green accounting and environmental strategies.

In examining the research field of green accounting, we find a series of interrelated research gaps. The lack of interdisciplinary research limits the deep integration of green accounting with environmental science, ecological economics and other fields, especially in terms of empirical research. This lack of integration further contributes to the lack of standardisation and normativity in the practice of green accounting, which affects its comparability across different organisations and regions. At the same time, research on the application of green accounting in policymaking and regulatory enforcement is particularly scarce in developing countries. This hinders progress in environmental governance and reflects deficiencies in the education and training system, resulting in a lack of necessary knowledge and skills among professionals. In addition, technological innovation in green accounting is still in its early stages. There is an urgent need to explore the application of new technologies and their potential impacts on the economy and the environment.

4.2 Alignment between results and the 'environmental responsibility and sustainability accounting framework'

This study posits that five perspectives form the theoretical framework for the antecedents, processes, and outcomes of green accounting research. Based on the framework's theoretical foundations, research objectives, and practical applications, it can be referred to as the 'environmental responsibility and sustainability accounting synthesis framework (ERSASF).' As shown in Fig. 5, the responsibility accounting theory provides a framework that emphasises the need for enterprises to assume social responsibility for environmental protection while pursuing economic profits. The external factors theory serves as a foundation for environmental impact accounting, illustrating how external environmental influences affect an enterprise's accounting practices. CBA is central to green accounting management, offering a quantitative basis for decision-making by evaluating the costs and benefits of environmental measures. The normative theory reflects the results of green accounting practices, focusing on how systems and norms can guide corporate behaviour to achieve environmental protection goals. Finally, the sustainable accounting theory is the origin of green accounting and emphasises its key role in promoting sustainable development.

Figure 5 Environmental responsibility and sustainability accounting synthesis framework (see online version for colours)



In summary, the findings from the green accounting bibliometric analysis align closely with the ERSASF, indicating that the theoretical foundation of this study is in harmony with the prevailing perspectives within the academic community. This consistency reinforces the validity of the study's theoretical framework, offering robust support for its conclusions.

4.3 An evaluation of the applicability of an integrated framework for environmental responsibility and sustainability accounting

In studying the field of green accounting, ERSASF offers valuable insights into how environmental factors influence various aspects of enterprise operations. It enhances the usefulness of green accounting information in optimising resource allocation and guiding long-term strategic planning, fosters the balanced development of enterprises in terms of economic efficiency and environmental sustainability, and addresses the limitations of a single theoretical perspective in explaining complex environmental issues. However, there are practical challenges in applying the framework, including its adaptability to dynamic environmental changes, difficulties in data acquisition, and limitations in stakeholder engagement. Additionally, its applicability varies across different contexts.

4.3.1 Developing versus developed countries

In developing countries, the applicability of the framework may be limited and require more localised adjustments because the regulatory system and market mechanisms may not be mature enough. In developed countries, the framework may be more readily accepted and applied because of better environmental regulations and stronger awareness of corporate social responsibility.

4.3.2 Different industries and enterprise sizes

For highly polluting industries, the applicability of the framework may be more significant, as it can help enterprises to better manage and reduce their environmental

impacts. For small enterprises, resource and capacity constraints may make it difficult to fully implement the framework and simplified or customised solutions are required.

4.3.3 Policy environment

The applicability and effectiveness of the framework may be enhanced in environments with strong policy support, including government incentives such as tax breaks and subsidies. In unstable or insufficiently supportive policy environments, firms may lack incentives to adopt the framework, thus undermining its applicability.

5 Conclusions

As an emerging research field, green accounting has made significant advances in both theory and practice, yet it continues to face numerous challenges. One of the primary challenges is the complexity of adoption. Previous research highlights the heterogeneous contexts in developing countries, meaning success stories from nations like China, supported by strong political backing, may not be easily replicated in countries with weaker governance structures. For instance, Zheng and Jin (2023) illustrated how green investments in Chinese-listed companies, supported by government subsidies and investor interest, notably improved corporate sustainability. While Zhou and Kythreotis (2024) detected a positive dual impact of green investments on both environmental protection and economic benefits. In contrast, Wiredu et al. (2023) found that in Ghana, despite the potential benefits of environmental cost considerations, weak regulatory frameworks and limited oversight hindered the success of green accounting. Similarly, Chetanraj et al. (2024) noted that while environmental strategies and green management accounting improved performance in Indian SMEs, inconsistent government support limited their long-term growth prospects.

Another challenge lies in the potential for greenwashing versus genuine transformation. While transparent environmental cost disclosures and managerial awareness can drive improvements, there is a risk that such disclosures may sometimes serve as symbolic gestures or greenwashing rather than fostering real change, particularly in contexts with weak public accountability. For instance, Hanif et al. (2023) found that stakeholders, such as customers or local authorities, often lacked the expertise to critically evaluate disclosed data, allowing companies to use green accounting more as a marketing tool than a transformative strategy. Similarly, Rahman and Islam (2023) noted that despite environmental data disclosures in Bangladesh, weak oversight diminished their impact on pollution reduction, rendering them largely symbolic.

The role of government subsidies is also crucial in sustaining green accounting, although these are often subject to political instability and budgetary constraints in developing countries. Zheng and Jin (2023) highlighted that while subsidies are vital to supporting green investments in China, political volatility and shifting priorities could undermine these mechanisms, posing risks to the long-term viability of sustainability initiatives.

In addition, human capital and educational gaps present another significant challenge. The effective implementation of green accounting relies on managerial awareness and workforce training. However, these solutions assume the availability of an educated workforce and robust training systems, which are often lacking in developing economies.

Akbar et al. (2024) found that in Indonesia, insufficient training and the absence of specialised educational systems hindered the adoption of environmental strategies and green accounting. Cultural norms and conservative managerial attitudes in some contexts further complicate learning and transformation, emphasising the need for well-structured educational programs.

Another challenge is the varying readiness across industry sectors. Not all industries in developing countries are equally prepared to adopt green accounting. Informal sectors or SMEs, particularly in agriculture, often lack the necessary resources or infrastructure for structured accounting systems. Thuan et al. (2024) showed that in Vietnam, formal industries with better access to resources and technology performed better in implementing green accounting. While informal SMEs and agricultural sectors faced significant financial and infrastructural challenges. This disparity suggests that policies should be tailored to the specific needs of each sector rather than adopting a one-size-fits-all approach.

Finally, the tension between short-term profit goals and long-term sustainability presents a significant challenge. While green accounting offers long-term benefits such as cost savings and increased resource efficiency, its adoption often requires initial investments in technology, training, and consulting services. These costs can strain the limited financial resources of developing countries. Kusuma et al. (2023) focused on creative industries in Indonesia, finding that SMEs in these sectors struggled to balance short-term profit goals with long-term sustainability due to resource constraints. Without long-term financial mechanisms or 'patient capital,' businesses may revert to cheaper, less sustainable practices during economic downturns.

Looking ahead, the future of green accounting presents both challenges and opportunities. The rapid advancement of data technology now offers the potential to enhance the accuracy and efficiency of environmental data processing. By leveraging artificial intelligence, big data analysis, and other cutting-edge technologies, a solid data foundation can be established for the quantitative analysis of green accounting. To facilitate this progress, governments and international organisations must provide robust policy support. This includes the establishment of uniform green accounting standards, the strengthening of relevant laws and regulations, and the provision of financial and tax incentives to encourage the adoption and expansion of green accounting practices. Interdisciplinary collaboration will also play a crucial role in driving innovation in green accounting theories and methodologies, with experts from fields such as accounting, economics, and environmental science coming together to tackle the complex issues faced. Furthermore, international cooperation and experience-sharing are essential for the global integration of green accounting. Countries should actively exchange knowledge on policy formulation, practice implementation, and talent development through enhanced communication and collaboration. Collectively, these efforts will contribute to the global application and evolution of green accounting, supporting the long-term goal of sustainable development.

References

Ackrill, R. and Igudia, E. (2023) 'Analysing the informal economy: data challenges, research design, and research transparency', *Economics*, Vol. 28, No. 4, pp.1317–2120.

Akbar, Y.K., Maratis, J., Nawangsari, L.C., Putri, R.K. and SK, P. (2024) 'The effects of green human resource management practices on sustainable university through green psychological climate of academic and non-academic staff', *Cogent Business and Management*, Vol. 11, No. 1, p.2375404.

Ananias, C.L. and Zimmerman, V.K. (1962) *Accounting Theory: Continuity and Change*, 1st ed., Prentice-Hall Press, Englewood Cliffs N.J.

Antti, T. (2018) 'Jules Dupuit and benefit-cost analysis: making past to be the present', *Transport Policy*, Vol. 70, No. 11, pp.14–21.

Aronsson, T. and Löfgren, K.G. (1998) 'Green accounting in imperfect market economies: a summary of recent research', *Environmental and Resource Economics*, Vol. 11, No. 34, pp.273–287.

Asiaei, K., Bontis, N., Alizadeh, R. and Yaghoubi, M. (2022) 'Green intellectual capital and environmental management accounting: natural resource orchestration in favor of environmental performance', *Business Strategy and the Environment*, Vol. 31, No. 1, pp.76–93.

Atkinson, G. (2000) 'Measuring corporate sustainability', *Journal of Environmental Planning and Management*, Vol. 43, No. 2, pp.235–252.

Bakhishli, A.V. (1996) 'Accounting strategies in agricultural enterprises: problems and solutions', *Scientific Works/Elmi Eserler*, Vol. 13, No. 6, pp.271–279.

Bartelmus, P. (2014) 'Environmental-economic accounting: Progress and digression in the SEEA revisions', *Review of Income and Wealth*, Vol. 60, No. 4, pp.887–904.

Beams, F.A. and Fertig, P.E. (1971) 'Pollution control through social costs conversion', *Journal of Accountancy*, Vol. 141, No. 2, pp.37–42.

Bilgen, S., Kaygusuz, K. and Sari, A.S. (2004) 'Renewable energy for a clean and sustainable future', *Energy Sources*, Vol. 26, No. 2, pp.1119–1129.

Bräuer, I. (2003) 'Money as an indicator: to make use of economic evaluation for biodiversity conservation', *Biotic Indicators for Biodiversity and Sustainable Agriculture*, Vol. 98, No. 3, pp.483–491.

Cairns R.D. (2001) 'Seeing the trees as a forest: what counts in green accounting', *Ecological Economics*, Vol. 36, No. 1, pp.61–69.

Chetanraj, D.B., Kumar, J.S., ManiKrishna, V. and Sai, V.S. (2024) 'Green decisions: the role of environmental strategies and proactivity in India's manufacturing micro enterprises', *Problems and Perspectives in Management*, Vol. 22, No. 2, p.240.

Ching, R. (2013) *Environmental Accounting Research*, 1st ed., Sanlian press, Shanghai.

Chitiga, M.M., Henseler, M., Maisonnave H., Mabugu, R. (2022) 'The impact of the COVID-19 enforced lockdown and fiscal package on the South African economy and environment: a preliminary analysis', *Environment and Development Economics*, Vol. 27, No. 3, pp.209–222.

Christofi, K., Kythreotis, A., Milad, S., Chourides, P. and Zhou, D. (2024) 'Impact of sustainability disclosure on financial statement value relevance: evidence from Europe', *International Journal of Business and Emerging Markets*, DOI: 10.1504/IJBEM.2028.10066588.

Delmas, M.A. and Burbano, V.C. (2011) 'The drivers of greenwashing', *California Management Review*, Vol. 54, No. 10, pp.64–87.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W.M. (2021) 'How to conduct a bibliometric analysis: an overview and guidelines', *Journal of Business Research*, Vol. 182, No. 9, pp.285–296.

Durkheim, É. (2016) *The Division of Labor in Society*, 2nd ed., Taylor and Francis Inc. Press, England.

Fayomi, G.U., Mini, S.E., Fayomi, O.S., Oyeleke, O.O., Omole, D.O. and Akinwumi, I.I. (2019) 'Overview of industrial pollution activities and its curbing mechanisms', *IOP Conference Series: Materials Science and Engineering*, Vol. 640, No. 1, pp.1–9.

Gonzalez, C.C. and Peña, V.J. (2023) 'A framework for a green accounting system-exploratory study in a developing country context, Colombia', *Environment, Development and Sustainability: A Multidisciplinary Approach to the Theory and Practice of Sustainable Development*, Vol. 25, No. 9, pp.9517–9541.

Gray, R. (1992) 'Accounting and environmentalism: an exploration of the challenge of gently accounting for accountability, transparency and sustainability', *Accounting, Organizations and Society*, Vol. 17, No. 5, pp.399–425.

Haab, T.C. (2002) *Valuing Environmental and Natural Resources: the Econometrics of Non-Market Valuation*, 1st ed., Edward Elgar Publishing, Cheltenham.

Hanif, S., Ahmed, A. and Younas, N. (2023) 'Examining the impact of environmental management accounting practices and green transformational leadership on corporate environmental performance: the mediating role of green process innovation', *Journal of Cleaner Production*, Vol. 414, No. 33, p.137584.

Hart, S.L. and Paul, S. (1995) 'Creating sustainable corporations', *Business Strategy and the Environment*, Vol. 4, No. 6, pp.154–165.

Hoff, J.V., Rasmussen, M.M.B. and Sørensen, P.B. (2021) 'Barriers and opportunities in developing and implementing a Green GDP', *Ecological Economics*, Vol. 181, No. 5, pp.53–61.

International Monetary Fund (IMF) (2011) *Classifications of Countries Based on Their Level of Development: How It Is Done and How It Could Be Done* [online] https://www.imf.org/external/pubs/cat/longres.aspx?sk=24628.0 (accessed 7 June 2024).

Johnson, H.T. and Kaplan, R.S. (1987) *Relevance Lost Rise and Fall of Management Accounting*, 1st ed., Business School Press, Harvard.

Jules, D. (1995) 'De la mesure de l'utilité des travaux publics (1844)', *Revue Française D'économie*, Vol. 10, No. 2, pp.55–94.

Kumar, S. and Managi, S. (2009) 'Environmental productivity and Kuznets curve', *The Economics of Sustainable Development*, Vol. 1, No. 1, pp.185–201.

Kusuma, H., Muafi, M. and Kholid, M.N. (2023) 'Pro-environmental MSMES performance: the role of green it adoption, green innovative behavior, and financial accounting resources', *Journal of Law and Sustainable Development*, Vol. 11, No. 4, pp.e673–e673.

Kythreotis, A. and Soltani, M. (2023) 'Relevance and faithful representation (reliability) of annual and semi-annual financial statements; a trade-off?', *International Journal of Managerial and Financial Accounting*, Vol. 15, No. 3, pp.393–412, DOI: 10.1504/IJMFA.2023.131779.

Kythreotis, A., Christofi, K. and Soltani, M. (2024) 'Examining the value relevance of financial statements in European countries: the importance of legal origins on cross-listing decisions', *Journal of Cogent Business and Management*, Vol. 11, No. 1, pp.1–12, DOI: 10.1080/23311975.2024.2340559.

Li, V. and Lang, G. (2010) 'China's 'green GDP' experiment and the struggle for ecological modernisation', *Journal of Contemporary Asia*, Vol. 40, No. 1, pp.44–62.

Liu, C.L. and Yu, L. (2010) 'Notice of retraction: study on the evaluation of national economy of port projects under the green GDP calculation system', *2010 Asia-Pacific Power and Energy Engineering Conference*, Vol. 2, No. 17, pp.1–4.

Lu, S.L. and Chiu, W.C. (2012) 'The grey forecasting model on the forecast of green GDP accounting in Taiwan', *Proceedings of the World Congress on Engineering*, Vol. 2, No. 198, pp.779–782.

Markham, D., Khare, A. and Beckman, T. (2014) 'Greenwashing: a proposal to restrict its spread', *Journal of Environmental Assessment Policy and Management*, Vol. 16, No. 4, pp.1–16.

Meyer, C.A. (1994|) 'Environmental and natural resource accounting: where to begin?', *Geographia Medica*, Vol. 24, No. 8, pp.119–125.

Okcabol, F. and Hoffman, J. (2015) 'Institutional accountability for true green', *Advances in Public Interest Accounting*, Vol. 18, No. 7, pp.123–160.

Opferkuch, K., Caeiro, S., Salomone, R. and Ramos, T.B. (2021) 'Circular economy in corporate sustainability reporting: a review of organisational approaches', *Business Strategy and the Environment*, Vol. 30, No. 8, pp.4015–4036.

Pearce, D.W. (1998) 'Cost? benefit analysis and environmental policy', *Oxford Review of Economic Policy*, Vol. 14, No. 3, pp.84–100.

Pigou, A.C. (1920) *The Economics of Welfare*, 1st ed., Macmillan and co., ltd press, London.

Pozzoli, M., Nastari, R., Pisano, S. and Venuti, M. (2023) 'How circular economy disclosure responds to institutional determinants empirical evidence in non-financial European firms', *Sustainability*, Vol. 15, No. 22, p.16069.

Rahman, M.M. and Islam, M.E. (2023) 'The impact of green accounting on environmental performance: mediating effects of energy efficiency', *Environmental Science and Pollution Research*, Vol. 30, No. 26, pp.69431–69452.

Rao, P.K. (2010) *The Architecture of Green Economic Policies*, 1st ed., Springer press, Heidelberg.

Razak, F.N.A., Ramli, A. and Rasit, Z.A. (2020) 'Organisation isomorphism as determinants of environmental management accounting practices in Malaysian public listed companies', *Humanities and Social Sciences Letters*, Vol. 8, No. 1, pp.110–122.

Rimmel, G., Baboukardos, D. and Jonäll, K. (2018) 'Revival of the fittest?', in *The Routledge Companion to Intellectual Capital*, 2nd ed., 2 Routledge Press, Park Square, Milton Park, Abingdon, Oxon OX14 4RN.

Sabihaini, Kurniawan, A., Eko Prasetio, J. and Rusdiyanto (2024) 'Environmental analysis and impact on green business strategy and performance in SMEs post the COVID-19 pandemic', *Cogent Economics and Finance*, Vol. 12, No. 1, p.2330428.

Sathaye, J. and Ketoff, A.N. (1991) 'CO2 emissions from developing countries: better understanding the role of energy in the long term', *The Energy Journal*, Vol. 12, No. 1, pp.161–196.

Schaltegger, S., Bennett, M., Burritt, R. and Mook, L. (2006) *Integrating and Reporting an Organisation's Economic, Social and Environmental Performance: The Expanded Value Added Statement*, 1st ed., Springer Nature Press, Dordrecht.

Sekerin V.D., Gorokhova A.E., Dudin M.N., Shibanikhin E.A. and Balkizov M.H. (2018) 'Green building: technologies, prospects, investment attractiveness', *International Journal of Civil Engineering and Technology*, Vol. 9, No. 1, pp.657–666.

Shah, S.M., Liu, G.Y., Yang, Q., Wang, X.Q., Casazza, M., Agostinho F., Lombardi, G.V. and Giannetti, B.F. (2019) 'Emergy-based valuation of agriculture ecosystem services and dis-services', *Journal of Cleaner Production*, Vol. 239, No. 25, pp.123–139.

Sinden, A. (2019) 'The problem of unquantified benefits', *Environmental Science, Economics*, Vol. 49, No. 6, pp.73–129.

Slawinski, N. and Bansal, P. (2015) 'Short on time: intertemporal tensions in business sustainability', *Organ. Sci.*, Vol. 26, No. 2, pp.531–549.

Spiller, M. and Deng, Y. (2014) 'Cost benefit analysis – key features and future directions', *Economics, Political Science*, Vol. 1, No. 1, pp.188–192.

Talvitie, A. (2018) 'Jules Dupuit and benefit-cost analysis: making past to be the present', *Transport Policy*, Vol. 70, No. 2, pp.14–21.

Thuan, L.D., Minh, M.T.H. and Huy, P.Q. (2024) 'Impact of social responsibility disclosure between implementation of environmental accounting, green HRM, energy efficiency, and sustainable development: a study of Vietnam', *Cuadernos de Economía*, Vol. 47, No. 133, pp.43–53.

Tsai, W.H., Chu, P.Y. and Lee, H.L. (2019) 'Green activity-based costing production planning and scenario analysis for the aluminum-alloy wheel industry under Industry 4.0', *Sustainability*, Vol. 11, No. 3, p.756.

Walter, I. and Ugelow, J. (1979) 'Environmental policies in developing countries', *AMBIO: a Journal of the Human Environment*, Vol. 8, No. 2, pp.102–109.

Wiredu, I., Osei Agyemang, A. and Agbadzidah, S.Y. (2023) 'Does green accounting influences ecological sustainability? Evidence from a developing economy', *Cogent Business and Management*, Vol. 10, No. 2, p.2240559.

Woo, J., Fatima, R., Kibert, C.J., Newman, R.E. and Tian, Y.F. (2021) 'Applying blockchain technology for building energy performance measurement, reporting, and verification (MRV) and the carbon credit market: a review of the literature', *Building and Environment*, Vol. 205, No. 7, pp.86–97.

Xiu, R. (2007) 'Research advances in assessment of green GDP indicator', *Chinese Journal of Ecology*, Vol. 26, No. 7, pp.1107–1113.

Yankun S. (2024) 'Research on resolving the contradiction between environmental protection and economic development in China', *Advances in Economics, Management and Political Sciences*, Vol. 12, No. 1, pp.182–189.

Zhang, G.N. (2023) 'Regulatory-driven corporate greenwashing: evidence from low-carbon city pilot policy in China', *Pacific-Basin Finance Journal*, Vol. 78, No. 14, pp.1–25.

Zhao, X.N., Qiu, Y., Lu, M.L. and Zhang, X.H. (2020) 'Performance analysis with carbon footprints in china: considering the industry heterogeneity', *Environmental Engineering and Management Journal* (*EEMJ*), Vol. 19, No. 9, pp.1555–1563.

Zheng, S. and Jin, S. (2023) 'Can enterprises in china achieve sustainable development through green investment?', *International Journal of Environmental Research and Public Health*, Vol. 20, No. 3, p.1787.

Zhou, D. and Kythreotis, A. (2024) 'Why issue green bonds? Examining their dual impact on environmental protection and economic benefits', *Humanities and Social Sciences Communications*, Vol. 11, p.1761, https://doi.org/10.1057/s41599-024-04318-1.

Zhou, K., Zhi, Q., Liang, J., Tao, Y. and Zhu, M. (2024) 'Threat or shield: environmental administrative penalties and corporate greenwashing', *Finance Research Letters*, Vol. 61, No. 1, pp.23–36.