Green Accounting, Financial Performance, and Company Value: A Bibliometric Study

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ABSTRACT: This research aims to examine the interconnection between green accounting, financial performance, and company value. This study employs a bibliometric approach utilizing bibliographic coupling and co-occurrence analysis, identifying 119 relevant articles on Scopus. The results reveal two prominent clusters, namely sustainability and sustainable development. Green accounting not only influences financial performance and company value but also has the potential to impact sustainability and sustainable development. For companies to thrive, it is crucial to consider corporate interests and environmental sustainability. This research will benefit researchers and academics exploring the relationship between green accounting, financial performance, and company value.


INTRODUCTION

Environmental issues have become crucial today due to the increasing global warming. Global warming threatens the Earth's sustainability as rising global temperatures result from the greenhouse gas effect and the high emissions of harmful gases trapped in the Earth's atmosphere (Cassia et al., 2018; Damas et al., 2021). Low-emission activities have become a global agenda in achieving net zero emissions by 2050. The Net Zero Emission (NZE) program requires changes for developed countries and industries to succeed in the program (Zahira & Fadillah, 2022), necessitating actions to reduce emission volumes (Lumbanraja & Lumbanraja, 2023). Recognizing the environmental role in the Earth's survival, companies, organizations, and governments can disseminate understanding among the public regarding the significance of environmental conservation. Environmental changes have negative impacts and can decrease economic growth and well-being (C. Yan et al., 2022).

In the modern business concept, accounting is under scrutiny by environmental observers (Sadiku et al., 2021). Financial information conveyed to the public in annual financial reports involves not only financial aspects but is also crucial for communicating non-financial aspects such as governance, social impact, strategies, long-term prospects, and environmental impact (Al-Dhaimesh, 2020; Lako, 2017; Maama & Appiah, 2019). Green accounting assesses the consequences of human actions on the ecological system and Earth's resources beyond the financial impact of these activities (Greenham, 2010).

The concept of green accounting began with the Stockholm Conference on June 5, 1972, which was designated as World Environment Day. Sustainable accounting can provide data about entities or companies contributing positively and negatively to human well-being and the environment (Sulistiaiwati & Dirgantari, 2016). Green accounting has become a prominent topic in the accounting field, both for researchers, authors, and other stakeholders, as it plays a role in measuring and disclosing environmental activities needed for the interests of external and internal parties (Ahmed et al., 2021). It enhances decision-making processes and functions as a framework to control, oversee, and furnish data and information within the context (Stanescu et al., 2020). Hence, economic entities, particularly businesses, are anticipated to be mindful of the influence of their operations on the environment (Wangi & Lestari, 2020).

The adoption of green accounting indirectly employs the triple bottom line concept, which emphasizes not only pursuing financial gains but also addressing social (people) and environmental (planet) concerns (Slaper, 2011). Companies must achieve maximum profit with minimal costs for stakeholders, evaluated based on the company's financial performance (Choiriah & Lysandra, 2023). The adoption of green accounting enhances financial performance, where companies willingly adhere to government policies related to environmental management, leading to improved public perception and loyalty, consequently boosting sales and profits (Dura & Suharsono, 2022). Green accounting, including environmental costs, waste recycling processes, and investments in research and development, being integrated into business operations, sets standards for consumers and investors,
fostering consumer trust and increasing sales and profits (Sidarta et al., 2023). Earlier studies propose an inverse correlation between green accounting and financial performance attributed to ineffective management of environmental costs (Riyadh et al., 2020). A detrimental association exists between green accounting and profitability, stemming from heightened environmental costs perceived by companies as supplementary expenditures that affect overall profitability (Sumiati et al., 2022).

Adopting green accounting has the potential to have a favourable effect on the company's overall value (Alexander, 2023). Company value reflects the condition, development, and public trust in the company (Suaidah, 2018). Environmental Management Accounting (EMA), a part of green accounting, can help companies minimize costs and improve performance in line with eco-efficiency theory (Agustia et al., 2019). Green accounting considers various variables, such as energy use that does not affect the company's value, water use with negative impacts, and emissions with positive implications on the company's value (Sukmadilaga et al., 2023). However, other findings show that green accounting does not impact the company's value (Astuti et al., 2022; Gantino et al. (2023). According to Jayanti & Romli (2022) and Dinniyah & Nuzula (2021), green accounting significantly negatively impacts the company's value.

Additional research results also suggest that incorporating green accounting practices within companies substantially influences Return on Assets (ROA) or profitability (Nengsih et al., 2022) dan Nugroho (2023). It has no influence on the company's value when channeled through financial performance as an intermediary factor (Sudimas et al., 2023) and has a significantly negative impact on company performance (Astuti et al, 2022).

From the above description, environmental issues remain a hot topic for research due to the global strength of environmental issues. The results of previous studies also provide diverse outputs. Thus, this research aims to analyze the current and future trends in green accounting research, financial performance, and company value.

METHODS
Sample

Data was retrieved from the Scopus website. The keywords used for the search were "green accounting," "environmental accounting," "environmental cost," "financial performance," and "firm value." The Boolean operator used was "AND." The search resulted in 119 documents that matched the keywords. The investigation was conducted on October 16, 2023, at 17:25 WIB.

Bibliometric Analysis Procedures

Bibliometric Analysis

As described by Wider et al. (2023), bibliometric analysis is a data-driven research approach that enables scholars to recognize and interpret patterns and trends within scientific literature. This quantitative research method, as employed by Fauzi (2023), entails the retrospective analysis of journal publications. In the present study, bibliometric analysis utilized VOSviewer software version 1.6.19. VOSviewer is a tool employed for constructing and visually representing bibliometric networks. These networks encompass entities such as journals, researchers, or individual publications and can be structured based on various factors such as citations, bibliographic connections, co-citations, or collaborative writing.

Bibliographic Coupling

Bibliographic coupling, as indicated by Fauzi et al. (2023), is well-suited for examining a range of themes grounded in contemporary advancements. The essence of bibliographic coupling pertains to the connection between two documents when both refer to the same source (Ma et al., 2022). This approach is deemed more fitting than alternative bibliometric analyses, like co-citation, since bibliographic coupling delineates themes derived from the most frequently cited publications, emerging trends, and smaller subfields.

Co-occurrence of Keywords

Another method within bibliometric analysis, as outlined by Wider et al. (2023), is the examination of co-occurring keywords, which aims to unveil connections between keywords and phrases in the literature. The primary purpose is to investigate relationships among keywords that may indicate currently emphasized influential topics. Co-occurrence keyword analysis explores relationships between concepts in document titles, keywords, and abstracts (Fauzi, 2023). These keywords can alternatively be derived from the complete text for examination. In this review, keywords are extracted from author keywords, aligning with the customary approach in bibliometric analysis literature.
RESULT AND DISCUSSION
Publication Trends and Descriptive Analysis

From the search results via Scopus, the total citations for the 119 documents are 1,980 times. The average citation per item is 16.6. A total of 119 published documents indicates an increase in green accounting, corporate performance, and firm value. The first publication was in 1994, but there were no further studies until the year 2000. A sharp increase occurred in 2017 compared to the preceding years. Before 2017, only 2 documents were published. In 2017, it increased to 9 published papers. The discussion on this topic peaked in 2023 with 35 documents. Subsequent investigations into the examination of green accounting, corporate performance, and firm value are anticipated to escalate in the forthcoming years, potentially leading to a rise in the number of publications in this domain. Figure 1 illustrates the volume of published documents spanning from 1994 to 2023.

Table 1. Top Ten Documents in Bibliographic Coupling Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Author</th>
<th>Title</th>
<th>Citations</th>
<th>Total Link Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Asiaei, K., Jusoh, R., Barani, O., &amp; Asiaei, A. (2022)</td>
<td>How does green intellectual capital boost performance? The mediating role of environmental performance measurement systems</td>
<td>17</td>
<td>91</td>
</tr>
<tr>
<td>3</td>
<td>Jell-Ojobor, M., &amp; Raha, A. (2022).</td>
<td>Being good at being good—The mediating role of an environmental management system in value-creating green supply chain management practices</td>
<td>11</td>
<td>49</td>
</tr>
</tbody>
</table>
In Figure 2, four different clusters (red, green, blue, and yellow) are identified and tightly bound. The fifth and sixth clusters comprise only two publications, so the author considers these clusters negligible. The subsequent section delves into present trends and prospective advancements. The clusters are identified and labelled through the author’s inductive interpretation:

- Cluster 1 (red): Designated as Cluster 1 and comprising 11 documents, this cluster is designated as “Environmental Management Accounting.” Environmental Management Accounting (EMA) encompasses the generation and examination of...
information, encompassing financial and non-financial aspects, to facilitate internal environmental management procedures. The exploration of EMA and environmental management within the Sri Lankan hotel sector reveals a revival of hotels' specific environmental management and EMA practices in response to cost-cutting endeavours amid a financial crisis, with support from all stakeholders. EMA's developmental stages highlight hotels' progression from a survival phase to an integration phase (Gunarathne & Lee (2015)). Additional scrutiny is warranted to explore the function of EMA mechanisms in companies that do not prioritize environmental outcomes solely for economic benefits (Derchi et al. (2013)). Positive associations are observed between Environmental Management Accounting (EMA), environmental knowledge management (KM) practices, and top management support (TMS) with environmental performance.

Furthermore, top management support (TMS) significantly mediates the relationship between EMA, environmental knowledge management (KM) practices, and outcomes related to environmental performance. Green workplace climate perception (GWCP) is positively correlated with environmental performance. Lastly, green workplace climate perception (GWCP) effectively reinforces the positive correlation between top management support and environmental performance (Bresciani et al. (2023)). EMA has encountered limitations in extending its scope beyond the coverage of material waste and greenhouse gas (GHG) emissions. In contrast, GHG accounting has established itself as a distinct framework, independently designed to document and disclose greenhouse gas emissions from organizational activities. This framework serves as a tool to aid companies in managing risks associated with GHG emissions (Debnath (2014)).

Cluster 2 (green): Cluster 2, with 7 documents, is labeled "Green Innovation." Green Innovation, or environmentally friendly product innovation, is using creative solutions to reduce negative environmental impacts and maximize sustainability. This cluster pertains to creating novel technologies, processes, products, services, or business models that exhibit greater environmental sustainability than the technologies they replace. Product and process innovations concentrating on environmental sustainability negatively correlate with firm value. Conversely, the interplay between environmental innovation and regulatory intensity, environmental agency pressure, and public pressure positively affects firm value (Yao et al. (2019)). A company's value, as measured by Tobin's Q, is projected to rise by 0.023 with every 1% increment in the share of environmentally friendly patent applications.

Furthermore, Green Innovation (GI) exhibits a persistent positive lag effect on firm value, lasting from 2 to 6 years. Additionally, heightened profitability is identified as a potential mechanism through which Green Innovation influences firm value, with the mediating effect accounting for 26.1% of the overall impact (Hao et al. (2022)). The maritime industry, specifically the port sector, has the potential to embrace eco-friendly systems. Novel approaches such as managerial accounting instruments and training, which currently lack extensive research, are recommended as efficacious strategies to enforce and promote the establishment of environmentally sustainable ports. The Balanced Scorecard and Tableau de Bord are recognized as managerial accounting tools to evaluate, monitor, measure, control, and communicate the activities of port organization stakeholders, particularly port authorities (PA), to foster the development of competitive and environmentally sustainable ports (Vaiio & Varriale (2018)).

Cluster 3 (blue): Designated as Cluster 3 and comprising 7 documents, this cluster is identified as "Financial Performance." Financial Performance represents a subjective evaluation of a company's adeptness in utilizing resources from its primary operations to generate income. This term is also employed as a broad metric for assessing the overall financial well-being of a company over a defined period. Notably, an inverse relationship exists between carbon emissions and financial performance, suggesting that commendable carbon performance is typically linked with superior financial performance. Moreover, market-based financial performance metrics correlate more favourably with carbon performance than accounting-based measures (Busch & Lewandowski (2018)). Environmental Management Accounting (EMA) demonstrates a positive and statistically significant correlation with both environmental performance (EP) and financial performance (FP) (Deb et al. (2023)). Furthermore, heightened revenue and cost reduction strategies as part of environmental engagement contribute positively to profitability (Yenidogan et al. (2021)).

Cluster 4 (yellow): Cluster 4, with 6 documents, is labelled "Green Accounting." Green accounting is an accounting approach to incorporating and connecting environmental cost considerations into corporate operations. The resurgence of interest in environmental accounting among accounting researchers raises concerns about its future trajectory (Cho & Patten (2013)). Utilizing green accounting indicators, such as green gross domestic product (GDP), in policy formulation and assessment can
play a pivotal role. The computation of Green GDP can enhance awareness of sustainability concerns among government officials and policymakers, often inclined toward prioritizing swift economic development in their respective countries (Rounaghi (2019)).

Table 2. Summary of bibliographic coupling analysis

<table>
<thead>
<tr>
<th>Cluster Number and Color</th>
<th>Cluster Label</th>
<th>Number of Publications</th>
<th>Representative Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (red)</td>
<td>Environmental Management</td>
<td>11</td>
<td>Gunarathne &amp; Lee (2015), Derchi et al. (2013), Bresciani et al. (2023), and Debnath (2014).</td>
</tr>
<tr>
<td>2 (green)</td>
<td>Green Innovation</td>
<td>7</td>
<td>Yao et al. (2019), Hao et al. (2022), and Vaio &amp; Varriale (2018).</td>
</tr>
<tr>
<td>3 (blue)</td>
<td>Financial Performance</td>
<td>7</td>
<td>Busch &amp; Lewandowski (2018), Deb et al. (2023), and Yenidogan et al. (2021).</td>
</tr>
</tbody>
</table>

Co-occurrence of Keywords

Using the identical database, an examination of co-occurrence identifies 38 keywords out of 799 that fulfil four predefined thresholds, leading to the analysis being categorized into five clusters. The foremost three co-occurrences encompass green economy (79 TLS), sustainable development (78 TLS), and sustainability (74 TLS). Table 3 delineates the top 15 keywords from the co-occurrence analysis. The prevalence of these keywords indicates that researchers are delving into studies associated with these terms, suggesting thematic connections with green accounting, financial performance, and firm value. Notably, elements about the green economy dominate the set of keywords in this analysis.

Table 3. Top 15 keywords in co-occurrence analysis

<table>
<thead>
<tr>
<th>Rank</th>
<th>Keyword</th>
<th>Occurrence</th>
<th>Total Link Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green Economy</td>
<td>15</td>
<td>79</td>
</tr>
<tr>
<td>2</td>
<td>Sustainable Development</td>
<td>19</td>
<td>78</td>
</tr>
<tr>
<td>3</td>
<td>Sustainability</td>
<td>20</td>
<td>74</td>
</tr>
<tr>
<td>4</td>
<td>Environmental Performance</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Economics</td>
<td>9</td>
<td>53</td>
</tr>
<tr>
<td>6</td>
<td>Innovation</td>
<td>13</td>
<td>51</td>
</tr>
<tr>
<td>7</td>
<td>Environmental Management</td>
<td>10</td>
<td>44</td>
</tr>
<tr>
<td>8</td>
<td>Finance</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>9</td>
<td>Environmental Protection</td>
<td>7</td>
<td>36</td>
</tr>
<tr>
<td>10</td>
<td>Environmental Policy</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>11</td>
<td>Carbon</td>
<td>6</td>
<td>34</td>
</tr>
<tr>
<td>12</td>
<td>Commerce</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>13</td>
<td>Human</td>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td>14</td>
<td>Financial Performance</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>15</td>
<td>Green Accounting</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>
Figure 3 highlights the identification of five closely interconnected clusters. These clusters exhibit overlap, suggesting potential future trends that are intricately interlinked. The ensuing discussion provides detailed insights into each cluster, accompanied by corresponding labels:

- **Cluster 1 (red):** Cluster 1, With 10 keywords, this cluster is labelled "Green Accounting and Sustainability." Green accounting will be highly relevant in the future in sustainability. Sustainability encompasses the capacity to uphold or sustain a process over an extended period. Typically dissected into three fundamental dimensions—economic, environmental, and social—sustainability is a guiding principle. Numerous businesses and governments are dedicated to pursuing sustainable objectives, including initiatives to diminish environmental impact and conserve resources. The correlation between environmental conservation and economic growth underscores an interconnected relationship, fostering financial expansion and development while safeguarding natural resources to sustain environmental services essential for human well-being (Kasayanond et al., 2019). The role of marketing in environmentally sustainable supply chains and its interplay with eco-friendly manufacturing and operations have been relatively overlooked.

- **Cluster 2 (green):** Cluster 2, comprising 8 keywords, is designated "Green Accounting and Sustainable Development Enhance Financial Performance." Sustainable development is a management principle directed towards attaining human development objectives while ensuring that the natural system continues supplying essential natural resources and ecosystem services for human needs. The emphasis lies not in achieving an abundance of sustainable development goals but rather in concentrating on those goals with the most potential for enhancing business performance (Peña et al. (2023)).
Multinational enterprises (MNEs) regarding corporate social responsibility (CSR) The activities and consequences of sustainable development within the realm of international business (IB) are explored, underscoring sustainable development as a conceptual framework shaped by the imperative to provide society with a form of development capable of addressing present needs without compromising the ability of future generations to fulfil their requirements (Kolk & van Tulder (2010)). In the 21st century, sustainable development has garnered widespread acknowledgement as a societal goal, emphasizing the distribution of economic growth across the population as a gauge of development. While economic growth can enhance the standard of living for a limited segment of the people, it often leaves the majority of the populace in poverty (Kruja, 2013).

Cluster 3 (blue): Cluster 3, featuring 5 keywords, is titled "Environmental Accounting and Financial Performance." Environmental accounting involves identifying the use of resources and evaluating and conveying the economic impact costs of companies or, on a broader scale, at the national level, on the environment. Notably, a substantial relationship exists between environmental accounting disclosure and the equity profit of selected companies. However, a negative correlation is observed between environmental accounting disclosure and the yield on the capital employed and the net profit margin of selected companies, stemming from the absence of environmental reporting and disclosure practices. Enhancing control and performance measurement is imperative, and there is a call to encourage companies, particularly smaller ones, to incorporate their environmental practices in annual reports to augment competitiveness and elevate corporate performance (Ezeagba et al. (2017)). The correlation analysis reveals a positive relationship between the Environmental Accounting Reporting Score (EAR) and profit margin (PM). However, the Earning Asset Ratio (EAR) does not exhibit a significant correlation with financial metrics such as Return on Average Equity (ROAE), Earnings per Share (EPS), and Return on Average Assets (ROAA).

On the other hand, factors such as size, capital ratios, overhead costs, and loan ratios substantially impact overall financial performance (Dhar & Ferdous Chowdhury (2021)). Further research is required to comprehensively explore financial performance, managerial accounting, external and internal audits, taxation, and financial accounting issues. This is essential for addressing additional environmental concerns (Polycarp (2019)).

Cluster 4 (yellow): Cluster 4, designated "Environmental Performance and Financial Performance," has 6 keywords. Environmental performance encompasses the comprehensive outcomes of a company's initiatives in managing environmental issues stemming from its operational activities. Limited evidence suggests that elevated environmental performance (EP) enhances companies' financial performance (FP). The correlation between EP and FP is affirmative, particularly during economic challenges, implying that companies should persist in allocating resources to environmentally friendly and sustainable projects amid the COVID-19 crisis. This means that, even in times of crisis such as the COVID-19 pandemic, business models emphasizing environmental friendliness positively influence the financial framework of companies (Kaakhe & Gokmenoglu (2022)). A positive correlation exists between environmental performance and debt costs, while no association is observed between environmental performance and equity costs. This suggests that investors typically gain advantages from companies that exhibit favourable environmental performance, which is often linked with greater sustainability (Felisha & Rossieta (2018)).

Cluster 5 (purple): Cluster 5, titled "Green Innovation and Firm Value," comprises 4 keywords. Green innovation involves the development of products, processes, or technologies that are sustainable, resource-efficient, and capable of mitigating adverse environmental effects. The impact of green innovation on a company's financial performance follows a U-shaped trajectory, initially showing adverse effects but turning more favourable as innovation levels supporting environmental sustainability rise. Additionally, the negative influence of environmental process innovation on corporate financial performance is mitigated by social capital in environmental innovation (Xie et al. (2022)). Additional discoveries comprise the following: 1) A rise in the percentage of patent applications concentrating on environmental sustainability results in a temporary decrease in the company's value, particularly in the short term; 2) The influences of innovation promoting environmental sustainability on corporate valuation are mediated by financial flexibility and analyst coverage; 3) Heterogeneity analysis outcomes suggest that companies can potentially alleviate the adverse effects of sustainable innovation by augmenting equity incentives for executives and addressing the salary disparity between management and employees (Z. Xie et al. (2022)). The positive impact of green innovation and environmental management on corporate
environmental performance is evident, and green innovation serves as a comprehensive mediator between environmental management and environmental performance. Notably, green innovation substantially positively influences firm value (Yan & Zhang (2021)).

Table 4. Summary of Co-occurrence Analysis

<table>
<thead>
<tr>
<th>Cluster Number and Color</th>
<th>Cluster Label</th>
<th>Number of Keywords</th>
<th>Representative Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (red)</td>
<td>Green Accounting and Sustainability</td>
<td>10</td>
<td>Sustainability, environmental sustainability, carbon emission</td>
</tr>
<tr>
<td>2 (green)</td>
<td>Green Accounting and Sustainable Development</td>
<td>8</td>
<td>Sustainable development, environmental protection, supply chain</td>
</tr>
<tr>
<td>3 (blue)</td>
<td>Environmental Accounting and Financial Performance</td>
<td>5</td>
<td>Environmental accounting, corporate social responsibility, green finance, financial performance</td>
</tr>
<tr>
<td>4 (yellow)</td>
<td>Environmental Performance and Financial Performance</td>
<td>6</td>
<td>Environmental performance, performance assessment, energy efficiency</td>
</tr>
<tr>
<td>5 (purple)</td>
<td>Green Innovation and Firm Value</td>
<td>4</td>
<td>Green innovation, green economy, green social capital</td>
</tr>
</tbody>
</table>

CONCLUSION

This research offers a current bibliometric analysis of green accounting, financial performance, and firm value. Two analyses were performed using bibliographic coupling and co-occurrence analysis to map and unveil the underlying themes of current and future trends. The identified clusters highlight two major themes: sustainability and sustainable development. The findings suggest that green accounting impacts not only financial performance and firm value but also sustainability and sustainable development. It emphasizes the importance, for companies to thrive, of not only prioritizing corporate interests but also actively considering environmental sustainability.

REFERENCES


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