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### Research on Sustainability Accounting: Period 2014-2023

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#### Abstract

Sustainable development is harmonious development in all aspects: Economy, society, and environment, with the aim of meeting the needs of material life and spiritual culture without causing damage to natural resources or reducing the quality of life in the future. The purpose of this study is to systematize previous studies on the application of sustainability accounting in enterprises, use statistics, and evaluate, according to the authors, the most influential research articles in the study of sustainability accounting in enterprises. The research data was collected and analyzed

from OpenAlex data on VOSviewer software 1.6.19, with 651 articles for the keyword "sustainability accounting" filtered in journal form. The results show that research on sustainability accounting in enterprises over the past 10 years has always been a topic of interest and research. The study also identifies the most influential authors by number of articles and citations. The research results have contributed to synthesizing a system of research documents on the application of sustainability accounting in enterprises.

**Keywords:** Sustainability Accounting, Sustainable Development, VOSviewer

#### 1. Introduction

Spence, L. J., and Rinaldi, L. (2014)<sup>[4]</sup> researched a case study of embedding sustainability in a supply chain. This essay looks at an organization's use of sustainability accounting to try to control supplier-related social, economic, and environmental challenges. We propose the notion of governmentality and four analytics of government as methodical methods to investigate the use of power and authority. This theoretical framework sheds light on the unique justifications and governmental procedures that make it possible to formulate certain reform goals, including sustainability. The examination of how sustainability-focused practice regimes are implemented within a single supply chain of a large UK supermarket chain in opposition to government theory and analytics informs the study. The study provides new empirical insights into how sustainable accounting shaped supply chain practices, justifications, and power structures. It investigates how often senior decision-makers use sustainability accounting to promote disciplinary consequences that are purportedly based on environmental and social objectives. It is discovered that in reality, they are recast mostly in accordance with an economic regime of practice as opposed to a social or environmental one.

Ascani, I., Ciccola, R., & Chiuicchi, M. S. (2021)<sup>[1]</sup> researched a structured literature review about the role of management accountants in sustainability accounting and reporting. Management accountants play a critical role in introducing novel accounting and reporting systems within organizations to aid managers in their decision-making. In order to understand how research is progressing, identify prospective research avenues, highlight the focus of the existing literature, and provide a critical analysis of the developments, this paper conducts a literature review on the role of management accountants in sustainability reporting and accounting. In contrast with non-accountants, management accountants have thus far demonstrated a comparatively limited level of engagement. Scholars and practitioners alike agree that a greater degree of management accountant involvement is necessary to facilitate the widespread adoption and integration of sustainability reporting and accounting within organizations, as well as to encourage managers to adopt such practices. For example, more research into how accounting education can help management accountants learn more about sustainability and how they can broaden their skills to include more areas of expertise are important factors that lead to them becoming more involved. Thus, to promote the adoption and enhancement of sustainability accounting and reporting, we urge further investigation into the roles, responsibilities, and competencies that management accountants ought to possess.

Tiwari, K., and Khan, M. S. (2020) [5] researched sustainability accounting and reporting in Industry 4.0. Industry 4.0 is the fourth industry transformation. Cloud manufacturing, industrial Internet of Things components, real-time data collection, predictive analytics via big data analytics, and artificial intelligence all contribute to its construction. We determine the value and complexity of Industry 4.0 by examining prior research studies. Several research studies have made suggestions regarding the design components and impact of Industry 4.0 on achieving sustainability goals. This study investigates the impact of Industry 4.0 on sustainability accounting and reporting in greater depth in order to generate a novel research challenge. This study used interviews and two focus groups to come up with an empirical model that shows a link between certain important topics and the features of Industry 4.0 as well as the disclosures made under the International Corporate Governance Initiative. The empirical formulation transfers each level of maturity of the Industry 4.0 framework in India to the corresponding triple bottomline topics defined by the Global Reporting Initiative. Additional investigation is necessary to validate this empirical formulation, given that it seems to be an overly pessimistic depiction by the participants in the two focus groups. The interviewees advised exercising caution due to the potentially lengthy maturity curve associated with AI-based predictive analytics and automation. As an organization approaches the maturation of Industry 4.0, soft aspects such as resistance to complexity and adoption of new technologies may necessitate the ongoing development of technical and other training programs pertaining to sustainability accounting and reporting.

Therefore, this study helps readers grasp the development of sustainability accounting through the frequency of keyword usage, the number of citations, and the number of research articles on this topic. At the same time, it helps future researchers to know the trend of this topic over time.

## 2. Sustainability Accounting

Sustainability accounting focuses on providing information to assess the risks and opportunities that a business may have in its sustainability activities. Sustainability accounting refers to a range of techniques, tools, and practices used in measuring, planning, controlling, and reporting on an organization's environmental, social, and economic performance. Similar to financial and management accounting, sustainability accounting has the potential to be a very powerful mechanism through which both individual organizations and their various stakeholders can better assess the environmental, social, and economic dimensions of their activities. This can involve either calculating the environmental, economic, and social impacts of an organization and its activities or assessing, evaluating, and accounting for the extent to which an organization is dependent on its environmental, social, and economic context. Sustainability accounting has the potential to make visible issues that were previously invisible to conventional accounting systems. It therefore extends the scope of information used in organizational decision-making and the assessment of organizational success.

There are environmental, social, and ethical issues that companies or organizations can manage in a timely manner by assessing their interactions with the environment and society. Many stakeholders expect companies or

organizations to carry out operations that aim for sustainability and report on these actions and their results. It is necessary to understand sustainable development in a comprehensive and holistic manner, as it is essential for humankind's future to ensure that we leave a habitable planet for future generations. Sustainability management, also known as sustainable performance, acknowledges the sustainable impact of companies' actions. The demand for information from stakeholders such as governments and communities where the company has its operations center and processing plant is increasingly expanding the amount and type of information that needs to be disclosed. This situation has led accountants, both practitioners and academics, to broaden their view of accounting and accountability, enabling them to develop the skills and competencies needed to inform society about the sustainable impact of companies or organizations, linking sustainability to accounting. The accountability system provides an opportunity to demonstrate the results of the social commitment expressed in the organization's mission and vision, as well as the efficient provision of goods and services to meet community needs. In fact, accounting should tend to seek an instrument that represents and measures all the elements of wealth (the accountability system), since one of its main objectives is the conceptualization and measurement of the phenomenon of corporate social responsibility. Moreover, accounting can contribute to achieving sustainability goals. In this context, sustainability accounting has emerged, addressing the treatment of business transactions. It considers economic, environmental, and social factors to protect business assets and safeguard society's interests.

Sustainability reporting completes the process by communicating the organization's sustainability performance (economic, environmental, and social). While sustainability accounting and sustainability reporting are distinct terms, they act as accountability tools for a company's sustainable production and operations, including the company's communication of its performance on issues such as biodiversity, climate change, and human rights.

The concept of sustainability accounting entails treating business transactions undertaken by companies (considering economic, environmental, and social factors), communicating the results through sustainability reports, providing comprehensive information on the entity's sustainability performance to society, and communicating the organization's impacts to internal and external users through financial and non-financial reporting. The concept acknowledges the obligation of organizations to inform financial statement users about the effects of their non-financial activities, such as energy efficiency, waste management, water and air emissions, employment, occupational health and safety, employee training, community and volunteer activities, supply chain, quality control, regulation, and compliance, within a triple bottom line framework.

## 3. Research Methodology

The authors synthesize previously published review papers related to sustainability accounting from the OpenAlex database. The review studies aim to explain the research imperative and indicate research gaps. The authors used VOSviewer software 1.6.19 to filter data with the keyword "sustainability accounting" searched in the abstract of the

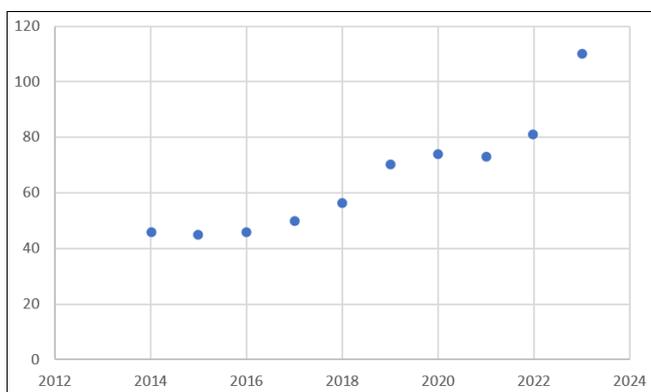
OpenALEX database, accessed on March 20, 2024. The results yielded 651 relevant articles. We used the collected data to analyze and answer the following research questions:

- Q1:** The number of sustainability accounting studies from 2014 to December 2023.
- Q2:** The most influential authors by the number of publications and citations in sustainability accounting publications.
- Q3:** Which keywords belong to which themes?

**4. Results**

**a. Sustainability Accounting Publication Statistics**

From 2014 to 2023, the authors found 651 sustainability accounting publications in the form of journal articles from the OpenALEX database. Books and book chapters were excluded by the authors. Researchers publish an average of 65.1 articles annually. This indicates that sustainability accounting remains a topic of interest for researchers.



**Fig 1:** Number of publications per year

**b. Highest Citations by Documents**

Table 1 shows that the article by John Flower (2015), "The International Integrated Reporting Council: A story of failure," has the highest number of citations (473), followed by Richard Wood, Konstantin Stadler, *et al.*, (2014), "Global Sustainability Accounting - Developing EXIOBASE for Multi-Regional Footprint Analysis," with 332 citations. Gaia Melloni, Ariela Caglio, Paolo Perego (2018), "Saying more with less? Disclosure conciseness, completeness and balance in Integrated Reports," has 235 citations. The remaining articles have all been cited more than 70 times.

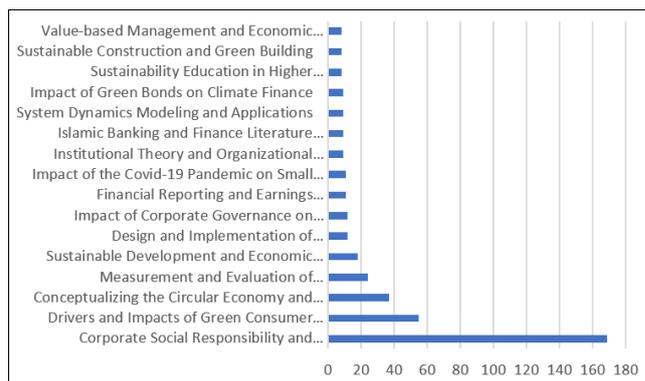
**Table 1:** Frequency of the highest citation by documents

Documents	Cited
The International Integrated Reporting Council: A story of failure (2015)	473
Global Sustainability Accounting - Developing EXIOBASE for Multi-Regional Footprint Analysis (2014)	332
Saying more with less? Disclosure conciseness, completeness and balance in Integrated Reports (2017)	235
Governmentality in accounting and accountability: A case study of embedding sustainability in a supply chain (2014)	154
Sustainability performance evaluation: Literature review and future directions (2018)	149
From sustainability accounting to a green financing system: Institutional legitimacy and market heterogeneity in a global financial centre (2018)	143
Sustainability accounting and reporting in the mining industry: current literature and directions for future research (2014)	110
Sustainability in mining, minerals and energy: new processes, pathways and human interactions for a cautiously optimistic future (2014)	104
Stakeholder engagement in sustainability accounting and reporting (2018)	93
Integrating stakeholder theory and sustainability accounting: A conceptual synthesis (2020)	92
Shifting the focus of sustainability accounting from impacts to risks and dependencies: researching the transformative potential of TCFD reporting (2020)	91
Reflexivity in Sustainability Accounting and Management: Transcending the Economic Focus of Corporate Sustainability (2014)	86
Journal ranking effects on junior academics: Identity fragmentation and politicization (2015)	86
Sustainability accounting and reporting in the industry 4.0 (2020)	84
"Good" news from nowhere: imagining utopian sustainable accounting (2015)	84
Multiple perspectives on integrated management systems and corporate sustainability performance (2017)	76

Source: Authors compiled from VOSviewer software

**c. Sustainability Accounting Related Themes Statistics**

In the 10 years from 2014-2023, numerous sustainability accounting-related themes were investigated by researchers, including Corporate Social Responsibility and Financial Performance with 169 articles, Drivers and Impacts of Green Consumer Behavior with 55 articles, Conceptualizing Sustainable Economy and Sustainable Supply Chain with 37 articles. Other themes such as Measuring and Evaluating Sustainability, Sustainable Development and Economic Management, Management Control System Design and Implementation, Corporate Governance Impact on Firm Performance, Financial Reporting and Earnings Management, etc., were also researched with more than 9 articles each.



Source: Authors compiled from VOSviewer software

**Fig 2:** Statistics on topics related to Sustainable Accounting

**d. Co-authorship analysis**

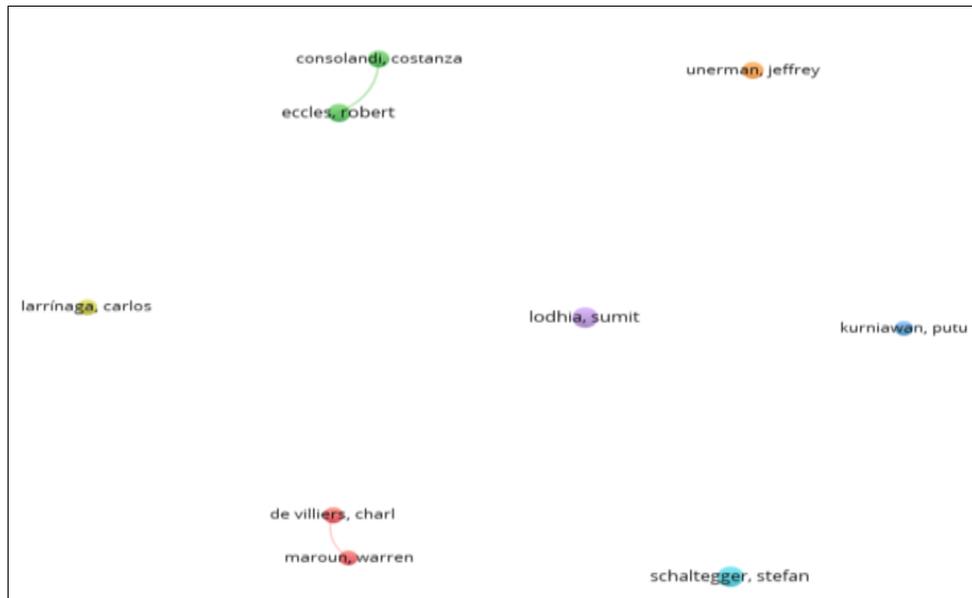
The statistics of authors who have the most co-authored articles on sustainable accounting are Schaltegger, Stefan with 11 articles, Lodhia, Smit with 11 co-authored studies, Eccles, Robert with 9 co-authored studies. Other authors also have at least 6 co-authored studies.

**Table 2:** Number of co-authored articles

Selected	Author	Documents
<input checked="" type="checkbox"/>	consolandi, costanza	8
<input checked="" type="checkbox"/>	eccles, robert	9
<input checked="" type="checkbox"/>	de villiers, charl	7
<input checked="" type="checkbox"/>	maroun, warren	6
<input checked="" type="checkbox"/>	kurniawan, putu	6
<input checked="" type="checkbox"/>	larrinaga, carlos	7
<input checked="" type="checkbox"/>	lodhia, sumit	11
<input checked="" type="checkbox"/>	schaltegger, stefan	11
<input checked="" type="checkbox"/>	unerman, jeffrey	8

Source: Authors compiled from VOSviewer software

The authors conducted an analysis of the co-authorship relationship between individual authors. Fig 2 presents the co-authorship network map. The link between two nodes represents the cooperative relationship between two authors, and the thickness of the link represents the intensity of cooperation. The group of authors who cooperate most closely are the authors shown in the figure below. This is a cohesive group that has published many articles over the years.

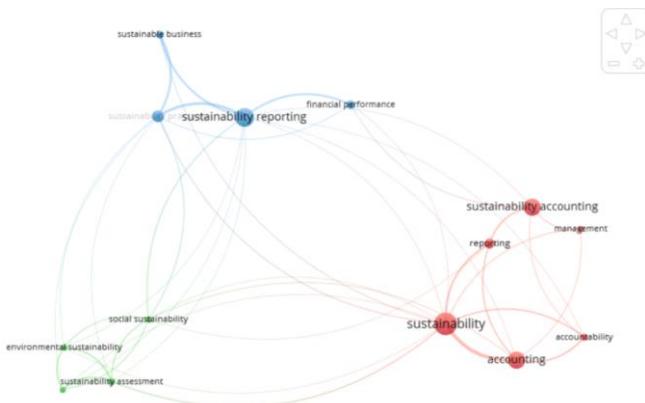


Source: Authors compiled from VOSviewer software

Fig 3: Co-authorship network

e. Keyword analysis results

In the keyword analysis section, the study selected 14 keywords that appeared 12 times or more. The keywords are evaluated by the software based on the number of occurrences and the total link strength. The results of the keyword analysis can be exported as an image file. The keyword analysis result image is as follows:



Source: Authors compiled from VOSviewer software

Fig 4: Co-occurrence networks

Related keywords are grouped together into groups, each group is a separate color. Looking at the image, it can be seen that the keywords are divided into 3 groups. Group 1 is represented by red links, combined with 6 keywords including accountability, accounting, management, reporting, sustainability, sustainability accounting with the central keyword being "sustainability" with 12 links and the total link strength is 95, this keyword appears 164 times. Group 2 is represented by green links, combined with 4 keywords: Environmental sustainability, social sustainability, sustainability assessment, sustainability indicators, in which the central keyword is "sustainability assessment" with 6 links and the total link strength is 31 and appears 16 times. Group 3 is represented by blue links, including 4 keywords: Financial performance, sustainability practices, sustainability reporting, sustainable business with the central keyword being sustainability reporting with 11

links and the total link strength is 77, appearing 107 times. With 3 research directions and 14 common keywords, the results provide an overview of the issue of sustainable accounting. Future research can be based on this to choose a research direction to fill the gap or analyze further.

5. Conclusion

In today's society, sustainable development is an urgent need. Sustainable development must ensure social balance and environmental protection. In this study, we conducted a systematic review of sustainable accounting research indexed in the OpenAlex database. These studies were published in the past 10 years, from 2014 to 2023, to provide detailed information on the number of publications, the frequency of citations by authors, the citations of studies, keyword networks, etc. The research results have contributed to the general theoretical framework, serving as a basis for reference studies on the sustainability accounting. Data collected from more abundant sources, such as Scopus, is also a suggestion for further research in the future.

6. References

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