Exploring the Research Fronts of Environmental Management Accounting in Corporate Sustainability: A Scientometric Analysis

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Abstract: Driven by economic globalization and the global nature of environmental issues, we have witnessed unprecedented economic growth and tangible progress on many key development issues. Among them, organizations in various fields play an essential role in realizing global sustainable development goals. Therefore, environmental protection has gradually become an essential factor that cannot be ignored in the development of enterprises. However, traditional accounting can no longer satisfy the information needed by enterprises in environmental management and decision-making. Therefore, applying environmental management accounting (EMA) in the sustainable development of enterprises is the future trend of enterprise development. This paper mainly analyzes the role that EMA can play in the long-term development of enterprises in the future, selects 148 relevant articles from the Web of Science (WoS) database, draws a co-word cluster, and analyzes the annual trend, knowledge structure, key areas, and publication sources, discusses the theoretical and practical significance. It also makes recommendations for companies driving EMA adoption in their organizations.

Keywords: Management Accounting,Sustainability,Scientometric Analysis

1. Introduction

With the popularity of green concepts, the vision of a sustainable society is also slowly changing stakeholders' expectations of enterprises, and these changes increase managers' demand for sustainability information [1]. In order to cope with this dynamic and complex economic environment and reduce the threat to the sustainable operation of enterprises [2], companies can introduce innovative management accounting tools and update forecast methods to meet the demand for new information [3]. Varzaru et al have proved that companies that use innovative management accounting tools more intensively tend to perform better [4]. Among them, Thi Tam Le et al surveyed chief management accountants of 600 large and medium-sized building material manufacturing enterprises in Vietnam and concluded that the application of EMA would have a positive impact on financial efficiency and environmental efficiency [5]. EMA, as an advanced analytical tool, can effectively help organizations improve their economic, environmental, and social performance in the process of management decision-making [6]. In the process of pursuing sustainable development, organizational information systems such as EMA can provide enterprises with environmental cost information [7] and analyze the cost and benefit data that influence decision-making [8]. Therefore, managers can implement more

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effective strategic decisions by understanding the improvements [9] in the information obtained by using EMA. At present, the role of EMA in environmental performance has not received much attention [10]. Based on the existing literature, this paper enriches the theory of using EMA practice to promote the sustainable development of enterprises.

2. Data and Methods

To collect information related to environmental management accounting and sustainable economy, we use the following Web of Science (WoS) advanced search query:

TS=("management accounting") AND TS=("Sustainable economy" OR "Sustainable")

A total of 148 articles (including SCI-EXPANDED, SSCI.) were collected on 06.6.2023. Since the search must satisfy both conditions, the Boolean logical operator AND is used to connect these conditional ions. Secondly, since knowledge or scientific mapping can be used to visualize knowledge structures and be used by researchers and policymakers, this study uses VOSviewer and Bibliometrix to clean and analyze the data set to better visualize such structures.

Through VOSviewer and Bibliometric software, literature information such as keywords, citation times, and annual trends are analyzed to make quantitative analysis and visual maps. In terms of technical processing and analysis technology, this article performs query design of keywords based on the research topic. This depends on the researcher's experience and repeated testing of database search technology. This part is the most important. After determining the feasibility of the research topic, start Download corresponding document format data according to the needs of different software for data input, and output more visual charts through the researcher's parameter settings. This requires multiple technical adjustments and data cleaning to ensure the quality and reliability of the output. Table 1 shows the basic information of the data set.

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Table 1. Basic information of data se**t**

Bibliographic Data Source	Web of Science Core Collection
Timespan	2003:2023
Sources (Journals, Books, etc)	90
Documents	148
Average citations per doc	15.78
References	8167
Keywords Plus (ID)	377
Author's Keywords (DE)	55
AUTHORS	355
Co-Authors per Doc	2.74

article	103
proceedings paper	32

3. Research results

3.1 Three-field chart

Three Field Plot can comprehensively analyze the relationship between different bibliometrix indicators, and build the network map of a comprehensive network among indicators. As shown in Figure 1, select "country" on the left side of the Three Field Plot, "author" in the middle field, and "keyword" on the right field. As can be seen from the figure, at present, European countries such as Spain, Romania, Ukraine, and China have made outstanding contributions to this field. Most of them focus on such topics as "environmental management accounting" and "sustainable development".

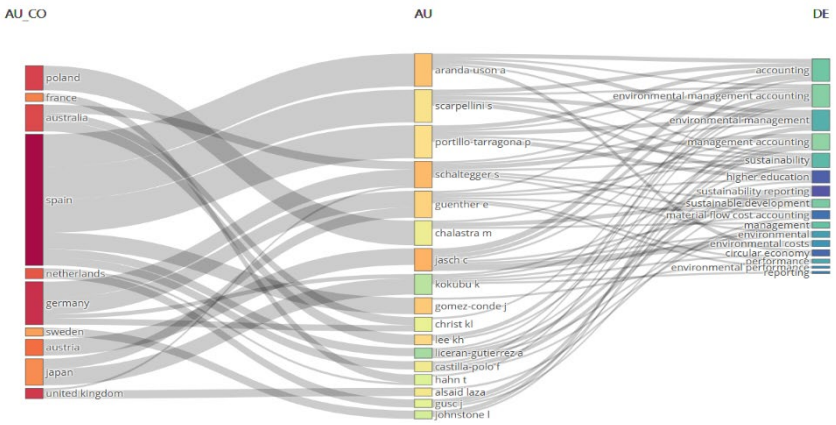

Fig. 1. Three Field Plot

3.2 Key areas

Figure 2 shows the top 25 countries or regions with more than three published papers via VOSviewer. The red cluster is dominated by countries such as Spain and includes other European countries such as Romania, Poland, and Ukraine, as well as countries such as Australia and Asian countries such as Australia and Malaysia. The purple cluster on the top left is dominated by Germany, while the blue cluster on the right includes two developed countries, Canada and France. The yellow cluster at the top includes developing countries such as China and Russia. Finally, the green cluster at the bottom includes developed countries such as the UK, Finland, Sweden, and the US, as well as developing countries such as South Africa. These findings illustrate the development of the interdisciplinary concept of integrating environmental factors into management accounting practices in both developed and developing countries, a trend that is likely to continue as organizations respond to rapidly changing environmental and economic issues.

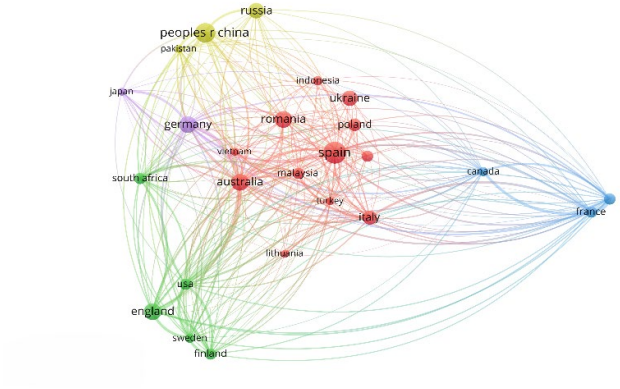

Fig. 2. Bibliometrix coupling network analysis: Top-25 regions/countries

3.3 Author keywords

Use VOSviewer software to build a co-citation map of author keywords, as shown in Figure 3. This time, the first 33 important keywords are selected for visual analysis and distinguished into clusters of three colors in Figure 3. The first one is the concept cluster of "approach", which is shown in red at the bottom of the figure. As can be seen from the figure, the existing literature mainly discusses the relationship between management accounting and sustainable development from the perspectives of sustainability, managers, and data. The green cluster focuses on "management accounting", which is also the main research direction. Scholars study the application of management accounting in different fields and enterprise activities through the definition of concepts and constantly enrich the concept of management accounting. The last one is the "sustainable development" concept cluster, shown in blue, related topics are "environmental management accounting", "information", "cost", "environmental performance", etc., indicating that if an enterprise wants to achieve sustainable development, it needs to analyze the relevant information of decision-making. Environmental management accounting provides cost analysis for the sustainable development of an organization, which is conducive to realizing the maximization of economic benefits.

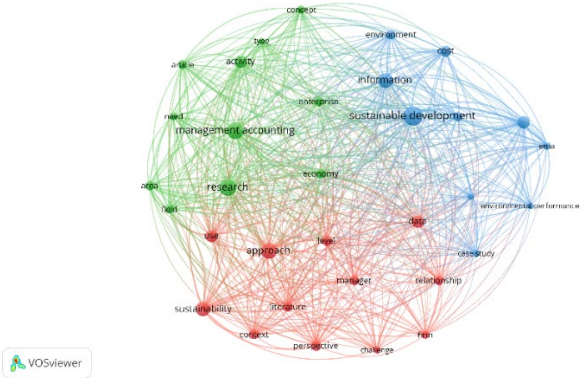

Fig. 3. Author keyword co-citation graph

3.4 Web of science category

The total classification of WoS is 40 items, and the first 10 items are extracted for analysis in this paper. As shown in Table 2, most of the top categories are related to green sustainability, environment, management, and business finance.

Table 2. WoS category

The Web of Science category	Number of Records	148 percentiles
Green Sustainable Science Technology	54	36.486
Environmental Sciences	49	33.108
Environmental Studies	40	27.027
Management	32	21.622
Business Finance	30	20.27
Business	24	16.216
Engineering Environmental	19	12.838
Economics	11	7.432
Social Sciences Interdisciplinary	7	4.73
Computer Science Information Systems	4	2.703

4. Conclusion

There are several compelling reasons for countries to develop the relationship between management accounting and sustainable development, which revolve around promoting responsible business practices, achieving sustainable development goals, and addressing environmental and social challenges. Integrating sustainability into management accounting practices can bring many economic and ethical benefits. Here are some of the key reasons why countries prioritize this relationship: long-term value creation, risk management, regulatory compliance, stakeholder expectations, enhanced decision-making capabilities, innovation and efficiency, cost reduction, competitive advantage, investor attractiveness, Reporting transparency, employee engagement, ethical responsibility, Sustainable Development Goals (SDGs), environmental protection and community well-being, etc.

In essence, developing the relationship between management accounting and sustainable development enables countries to align business practices with broader social and environmental goals. By integrating sustainability into management accounting, organizations can contribute to a more sustainable and equitable future while improving their financial performance and competitiveness.For organizations, environmental management accounting and sustainability are mutually beneficial, and the integration of the two helps organizations contribute to a sustainable future.

Cost analysis is the use of cost analysis techniques, such as activity-based costing and cost accounting, to provide reliable and accurate cost information for organizations to make more informed strategic decisions.

The combination of sustainability and management accounting helps measure key sustainability metrics related to reporting, such as carbon emissions, resource consumption, social responsibility, etc.

Stakeholder groups, including employees, investors, consumers, and governments, increasingly expect companies to demonstrate their commitment to long-term value creation to meet stakeholder expectations and build trust in the organization.

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