Sustainability Accounting: A Systematic Literature Review and Bibliometric Analysis

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Abstract

Although Sustainability accounting originated around the 1980s and has been actively developing in recent years, it is considered to be not fully explored. To help scientists better understand the conceptual essence of this term, a systematic review of the literature. The aim of the article is a bibliometric analysis of the concept of sustainability accounting to visualize the scientific landscape using bibliometric maps. Information retrieval for bibliometric analysis was conducted in two scientometric databases Scopus Elsevier and Web of Science Core Collection for the keyword "sustainability accounting" in the period between 2010-2020. Based on the information obtained and exported to the data file, the analysis of visualization and clustering of the study was performed and bibliographic maps were generated using the VOSviewer tool. Clustering is a statistical procedure that made it possible to break down a large array of information on the topic of sustainability accounting into multiply (clusters). According to the results of the analysis, 251 publications were received in Scopus and 252 in Web of Science, the vast majority of which are scientific articles. Our findings show that the number of articles published in this area during the analyzed period has increased significantly, which indicates the interest among scholars and the relevance of this issue. The constructed bibliometric maps, tables and graphs made it possible to visually identify the leading countries (United Kingdom, USA, Australia, Germany, Italy and Spain), scientists from which deal with this issue, the most productive journals (Journal of Cleaner Production, Sustainability (Switzerland), Sustainability Accounting Management And Policy Journal), as well as the main areas of research shortly (sustainability report, corporate social responsibility, sustainable development, disclosure).

Keywords: Sustainability accounting, Sustainable development, Corporate social responsibility, Bibliometric analysis

Introduction

Sustainability accounting is considered a subcategory of financial accounting and focuses on the disclosure of non-financial information about the results of the enterprise to external users (owners, creditors and authorities). Sustainability accounting in the scientific literature is often associated or equated with the concepts of social accounting, social and environmental accounting, corporate social reporting, corporate social responsibility reporting or non-financial reporting. This comparison is natural given that the above concepts are related. Nevertheless, we emphasize that the object of this study is the

formation of information about sustainable development in the accounting system at an early stage. While the reflection and generalization of information in integrated reporting as an important source in management decisions in the allocation of resources will be explored by us in the future. Therefore, integrated reporting can be considered as a derivative of sustainability accounting.

Sustainability accounting is related to activities that directly affect society, the environment, and the enterprise's economic performance. In this regard, many scientists (Boyer et al. (2016), Nobanee et al. (2021), Purvis et al. (2019) and others) identify three components (pillars) of sustainability accounting: social, environmental and economic (Fig. 1).

Figure 1: Scheme of sustainable development: at the confluence of three constituent parts (Adams (2006))

The formation of environmental and social accounting suggests that they are the basis of sustainable development, which is designed to take into account environmental and social information to enable users to form the right economic strategy that will meet the interests of business, social and environmental environment. In recent years, not only is the importance of environmental accounting in the overall system of accounting and reporting of enterprises but also expanding the range of its users. Social accounting is a relatively new direction in accounting, the exact definition of which is difficult to find in existing research. Social accounting includes 1) accounting for social responsibility (accounting for individual factors of social significance); 2) accounting for total impact (assessment of total costs of enterprises); 3) socio-economic accounting (evaluation of projects financed by society using financial and non-financial indicators that are not subject to monetary evaluation, but have a large public response); 4) accounting for social indicators (long-term non-financial quantitative socio-statistical assessment); 5) public accounting (attempts to build accounting on a global scale), which connects all types of social accounting.

Over the past couple of decades, the popularity of sustainable development accounting has grown. A large number of companies seek to use modern methods and techniques in disclosing information about the main activities and their impact on the environment. As a result, stakeholders want to better understand how companies manage their resources to achieve their goals in the context of sustainable development.

In the context of Ukraine's integration into the world market and with the transition to international standards of accounting and reporting, many large enterprises develop environmental and social policy, comprehensive programs for its implementation, plan measures for environmental protection and social security, analyze financial aspects and conduct environmental audits (Sokil (2018), Hyk et al. (2021), Vysochan et al. (2021)).

Literature Review

A large number of scholars have paid attention to the problems of forming the concept of Sustainability accounting: Adams et al. (2019), Dumay (2019), Gray (2010), Gulluscio et al. (2020), Hörischa et al. (2020), Hyk (2021), Kaur et al. (2018), Lamberton (2005), Larrinaga-Gonzalez et al. (2008), Lodhia et al. (2019), Passetti et al. (2014), Schaltegger et al. (2010), Siryk et al. (2021), Vysochan et al. (2021), Young (2011), Zyznarska-Dworczak (2020) and others.

Thus, Schaltegger et al. (2010) rightly point out that

"Sustainability accounting" and related terms are increasingly used in academia and corporate practice. This raises questions about the relationship and role of accounting in managing the sustainability of the enterprise.

Gulluscio et al. (2020) emphasize that over the past few years, sustainability has become an increasingly important aspect for the corporation. Many stakeholders expect companies to implement sustainability and reporting practices. As a result, corporate responsibility, corporate accounting and reporting should focus not only on financial, social and environmental performance but also on sustainability aspects.

Lamberton (2005) provided a brief historical essay and a personal look at how the sustainable development accounting system could be implemented.

Adams & Larrinaga (2019) conducted a systematic review of the scientific literature in accounting journals for the period 2007-2017 inclusive. The authors identified the methods, topics, and theories that researchers turn to.

The term "Sustainability accounting" is commonly used to describe a wide range of accounting and reporting tools. Passetti et al. (2014) in their research analyzed the use of eight tools for accounting for sustainability in management decisions. The results of surveys and interviews indicate that only a small number of companies use the tools, while others are more conservative.

Gray (2010) studied the component of Sustainability accounting – social accounting as a problem, multidisciplinary field and identified some possible areas that it can take.

Hörischa et al. (2020) proposed the concept of "Accounting for Sustainability and Stakeholders", which emphasizes which sustainable development topics and which stakeholders should be considered when accounting for a given organization and how the inclusion of additional stakeholders can help create value for them.

Zyznarska-Dworczak (2020) in her article presented sustainability accounting in the light of the positive and normative theory of accounting and proposed its conceptual basis as a normative solution.

Larrinaga-Gonzalez et al. (2008) investigated the issues of sustainability accounting and accountability in state-owned companies.

However, without underestimating the value of the work of the above scientists, it should be recognized that in the field of sustainability accounting, not all issues are final research and need further improvement.

This paper uses a bibliometric analysis of scientific publications on the problems of sustainability accounting. The use of bibliometric tools for data analysis allows you to process a significant number of publications, which makes it possible to

identify trends in research activities that are difficult to achieve without the use of special tools. This method of analysis allows to determine the directions of research with the required degree of depth and detail and to identify patterns in the publishing activity of scientists from around the world.

The article aims to form approaches to understanding the economic nature and analysis of the concept of sustainability accounting, as well as the identification of scientific schools in this area with further visualization of the scientific landscape using bibliometric maps. According to the purpose, the key tasks (research questions – RQ) are formed:

RQ 1: What is the total number of publications on sustainability accounting available in the Scopus and Web of Science scientometric databases?

RQ 2: What keywords are most often used in conjunction with the term sustainability accounting?

RQ 3: Which articles and authors have the highest citation on sustainability accounting?

RQ 4: What is the cooperation between countries on sustainability accounting?

Methodology

To study the thematic focus of publications and approaches for a deeper understanding of sustainability accounting, as well as the availability of scientific schools in this area with further visualization, we conducted a bibliometric analysis. For this purpose, a specialized computer program VOSviewer was used, which uses a clustering algorithm for a literature network, which is similar to the method of dividing modular networks. The following formulas are used for calculations (Waltman et. Al. (2010)):

$$V(c_1, \dots, c_n) = \frac{1}{2m} \sum_{i \leq j} \delta(c_i, c_j) \omega_{ij} (c_{ij} - \gamma \frac{c_i c_j}{2m})$$

(1)

$$\omega_{ij} = \frac{2m}{c_i} c_j$$

(2)

where c_i – is an element cluster i , γ – is a clustering resolution. By adjusting its size, you can create a clustering of different resolutions. The higher γ , the more clustering will be obtained and the more accurate the classification will be.

The formation of an array of information for bibliometric analysis took place in the following sequence:

1) a search query was conducted in two scientometric databases Scopus Elsevier and Web of Science Core Collection for the keyword “sustainability accounting”. The scope of this study selected the following scientific areas: “Economics, Econometrics and Finance”, “Business, Management and Accounting” and indicated the time period between 2010-2020. The following parameters (filters) were set for searching in databases:- in Scopus – TITLE-ABS-KEY (sustainability AND accounting) AND (LIMIT-TO (SUBJAREA , “BUSI”)) AND (LIMIT-TO (SUBJAREA , “ECON”)) AND (LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012) OR LIMIT-TO (PUBYEAR , 2011) OR LIMIT-TO (PUBYEAR , 2010)) - in Web of Science – TITLE: (Sustainability accounting)

Refined by: WEB OF SCIENCE CATEGORIES: (BUSINESS FINANCE OR ECONOMICS OR ENVIRONMENTAL SCIENCES OR MANAGEMENT OR BUSINESS OR PUBLIC ADMINISTRATION)

Timespan: 2010-2020. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI.

The data obtained from the specified selection of the scientometric databases Scopus and Web of Science were uploaded (via the functional option “Data Export”) and saved in a separate file.

2) based on the received data of the file exported from the Scopus and Web of Science databases, the bibliographic map was formed with the help of the universal software VOSviewer (Visualizing scientific landscapes). VOSviewer is a computer program that is freely available and offers functionality for building and visualizing bibliometric networks. The analysis in this program was aimed at identifying the frequency of sharing terms by researchers in the titles, annotations and keywords of scientific publications.

Results And Discussion

As a result of the analysis conducted in the period 2010-2020, approximately the same number of publications was found in the two databases – 251 documents in Scopus and 252 in Web of Science, respectively. Generalized information on the number of publications depending on the type of document is given in the table 1.

Document type	Scopus		Web of Science	
	number	%	number	%
Article	175	69,7	179	71,0
Proceedings paper	-	-	22	8,7
Book chapter	30	12,0	16	6,3
Early access	-	-	7	2,8
Editorial material	11	4,4	14	5,6
Review	19	7,6	6	2,4
Meeting abstract	-	-	6	2,4
Book review	-	-	1	0,4
Conference Paper	12	4,8	-	-
Book	4	1,6	1	0,4
The total number	251	100,0	252	100,0

Table 1: Total number of publications by document type

Source: generated by the authors based on search data in the Scopus and Web of Science database.

From the table 1 shows that mostly a larger number (approximately 70%) of the total volume of publications is created by scientific articles – 175 in Scopus and 179 in Web of

Science, respectively. Also among the publications, there is a small number of Proceedings paper, Book chapter and Review, which proved to be important. The excellent value of other types

of documents was not more than 6% of the total.

For quantitative analysis of publications with the formation of

graphic publications (Fig. 2).

Figure 2: Several publications on sustainability accounting in scientometric databases Scopus and Web of Science for the period 2010-2020

Source: formed by the authors based on data obtained from Scopus and Web of Science databases

As can be seen from Fig. 2 number of publications on sustainability accounting after 2017 is growing sharply due to the active work of scientists in many countries.

To study the thematic focus of publications and approaches for a deeper understanding of sustainability accounting, as well as the availability of scientific schools in this field with further

visualization, we conducted a bibliometric analysis based on Scopus and Web of Science databases in VOSviewer. This analysis was aimed at identifying the frequency of joint use of terms by researchers in the titles, annotations and keywords of scientific publications. The visual results of the implementation of interaction cycles are shown in Fig. 3.

Figure 3: Network visualization of the most commonly used terms in articles on sustainability accounting

Source: built by the authors using VOSviewer

It is worth noting that the bibliometric map shows the frequency of use of terms by the size of the circle and the closeness of the relationship and allows you to track variants of combinations of terms both within clusters and between them. The computer program VOSviewer builds network connections using publications that contain the most similar keyword shingles and groups them.

According to the results of grouping articles on sustainability accounting, 1133 keywords were identified by the frequency of use (frequency of use > 5), excluding duplicates and those that are not relevant for this analysis, such as abbreviations.

Thus, the clustering of the conceptual landscape of sustainability accounting reflects 15 areas of research on this

topic, which actively interact with each other. The largest cluster is "grey" with the word sustainability, which researches the direction of the current account, supply chains and adaptive governance. The "blue" cluster groups the term sustainability accounting. In the "pistachio" cluster, information is displayed in the context of "sustainable development" – cost management.

In general, research in the field of sustainability accounting in recent years is primarily related to the study of non-financial information, environmental reporting, environmental indicators, sustainability report and the very concept of "sustainability", in addition, closely related to corporate governance, integrated thinking, integrated approach, business models, evaluation, content analysis.

Visualization of the research network to complete the formation of the parameters of the scientific landscape of sustainability accounting also allows identifying patterns of citation between colleagues in the field of research. For

example, Fig. 4 shows that there is a distance between clusters that are located far from each other, or, conversely, very related in terms of co-citation.

Figure 4: Visualization of the research network of the most cited authors in articles on sustainability accounting

Source: Developed by the authors using VOSviewer

In Fig. 4 clearly identify the 5 most significant clusters, which are marked with different colours, within each of which the authors often cite each other and the areas of study of which are related. Clusters of scientists include studies by the following authors: cluster 1 (green) – Gray R., cluster 2 (pink) –

Burritt, RL, cluster 3 (red) – Wood R., cluster 4 (light green) – Boiral O. and cluster 5 (blue) – Schaltegger S.

Also, table 2 gives a rating of the most cited articles by these authors.

Article title	Authors	Year of publication	Number of citations	The name of the journal
Is accounting for sustainability actually accounting for sustainability...and how would we know? An exploration of narratives of organisations and the planet	Gray R.	2010	432	Accounting, Organizations and Society
Sustainability accounting and reporting: fad or trend?	Burritt, R.L. and Schaltegger, S.	2010	258	Accounting, Auditing & Accountability Journal
Global Sustainability accounting - developing EXIOBASE for multi-regional footprint analysis	Wood R. et al.	2015	224	Sustainability
Sustainability reports as simulacra? A counter-account of A and A+ GRI reports	Boiral O.	2013	224	Accounting, Auditing & Accountability Journal
Sustainability accounting for companies: Catchphrase or decision support business leaders?	Schaltegger S., Burritt R.	2010	164	Journal of World Business

Table 2: Rating (Top-5) of the most cited articles on sustainability accounting

As the data of a table 2, the most cited article (432 citations) is "Is accounting for sustainability actually accounting for sustainability ability and how would we know? An exploration of narratives of organizations and the planet" (by Gray R.), published in 2010. It can also be noted that the authors mentioned above have common articles, such as Burritt R.L.

and Schaltegger S.

Presentation of publications on topics in different countries of the world is important for bibliometric analysis. Thanks to this analysis, it is possible to understand in which countries scientists have made the greatest contribution to the study of this issue (Fig. 5).

Figure 5: Visualization of a research network of articles on sustainability accounting in terms of countries around the world

Source: Developed by the authors using VOSviewer

Note that the larger the area of the site, the greater the number of articles published in the country. The outer circle of the node is central. The thicker the outer circle, the stronger the

value of the relevant literature published in the country. More detailed results are given in the table 3.

Scopus			Web of Science		
No	Freq	Country	No	Freq	Country
1	49	United Kingdom	1	28	United Kingdom
2	37	United States	2	27	Australia
3	31	Australia	3	26	United States
4	19	Italy	4	18	Italy
5	16	Germany	5	17	Spain

Table 3: Top 5 countries with the most articles

From the table 3 we see that in the Scopus database the countries United Kingdom, USA, Australia, Italy, Germany are among the five countries with the largest number of publications, and in the Web of Science database United Kingdom, Australia, USA, Italy and Spain.

In the table 4 shows the 7 most-cited journals in the relevant literature sustainability accounting. Because some links may match, the number of links from the two databases do not merge.

Scopus				
No	Journal title	ISSN	SJR 2020	Articles
1	Journal of Cleaner Production	0959-6526, 1879-1786	1.94	14
2	Sustainability (Switzerland)	2071-1050	0.61	13
3	Sustainability Accounting Management And Policy Journal	2040-8021, 2040-803X	0.62	9
4	Social And Environmental Accountability Journal	0969-160X, 2156-2245	0.36	8
5	Accounting Auditing And Accountability Journal	0951-3574	1.74	7
6	Accounting Education	0963-9284, 1468-4489	0.87	6
7	Sustainability Accounting And Accountability	-	-	6

Web of Science				
1	Sustainability (Switzerland)	2071-1050	0.61	21
2	Journal of Cleaner Production	0959-6526, 1879-1786	1.94	14
3	Accounting Auditing And Accountability Journal	0951-3574	1.74	10
4	Sustainability Accounting Management And Policy Journal	2040-8021, 2040-803X	0.62	10
5	British Accounting Review	0890-8389, 1095-8347	1.22	5
6	Ecological Indicators	1470-160X	1.32	5
7	Accounting Organizations And Society	0361-3682	2.62	4

Table 4: The most cited journals by subject sustainability accounting

The most cited journals (in absolute terms) in the two scientometric databases Scopus and Web of Science, respectively, are the Journal of Cleaner Production and Sustainability (Switzerland).

Results And Discussion

The development of approaches to understanding sustainability accounting and the identification of the scientific landscape in this area are becoming increasingly important, as the needs and requests for reporting information of stakeholders are constantly growing. Therefore, it is important to update the definition to better understand what requirements and issues sustainability accounting should address at this time.

During the work on the article, we analyzed the latest research and publications of scientists in the field of sustainability accounting according to Scopus and Web of Science databases for 2010-2020. The result of the study was systematization and generalization of approaches to interpreting the concept of sustainability accounting. Also, thanks to the VOSviewer program, bibliometric analysis and clustering of research in the subject field of sustainability accounting was conducted.

The bibliometric analysis revealed that the number of publications on sustainability accounting in the databases Scopus (n = 251) and Web of Science (n = 252) are almost the same.

The largest number of them are scientific articles – respectively in the databases Scopus (n = 175) and Web of Science (n = 179).

Network visualization has allowed us to identify the keywords listed with the highest frequency, and they are likely to soon become the main areas of research (in descending order of frequency): reporting on sustainability, corporate social responsibility, sustainable development, information disclosure.

Our study helped identify the authors who contributed the most to their research and whose articles are most cited: Rob Gray (The Center for Social and Environmental Accounting Research, School of Management, University of St. Andrews, Scotland, United Kingdom), Roger Burritt (Fenner School of Environment and Society, The Australian National University), Richard Wood (Industrial Ecology Program, Norwegian University of Science and Technology (NTNU), Norway), Olivier Boiral (Department of Management, Université Laval, Quebec City, Canada), Stefan Schaltegger (Center for Sustainability Management (CSM), Leuphana University Lüneburg, Lüneburg, Germany). It should also be noted that geographically, the countries with the largest number of publications in the two scientometric databases Scopus and Web of Science included: United Kingdom, USA, Australia, Italy, Germany and Spain.

Another key point of this study was the establishment of journals with the largest number of articles on the topic – Journal

of Cleaner Production, Sustainability (Switzerland), Sustainability Accounting Management And Policy Journal, Social And Environmental Accountability Journal, Accounting Auditing And Accountability Journal, British Accounting Review and others.

As a result, it can be concluded that the study of problematic issues and identifying prospects for further development in the field of sustainability accounting are extremely popular and popular in the scientific literature. Prospects for further research are related to the need for the further scientific study of all theoretical and practical aspects of integrated reporting, determining the composition of financial and non-financial indicators to be disclosed, substantiation of methods to be used to determine individual indicators and costing mechanisms. business of the company of social events, etc.

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This study was conducted within 2 scientific topics: “Accounting in the context of sustainable economic development” (code of R&D work – OA-16) and “Formation and distribution of information flows between the subjects of the accounting system of the enterprise” (code of R&D work – OA-20).

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