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Corporate Value from the Perspective of Sustainable Development Research: A SciMAT Bibliometric Analysis

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ABSTRACT

Objective: This paper aims to synthesise the extant literature on corporate value in the context of sustainable development research over the past two decades with a focus on 2004–2023.

Research Design & Methods: The study uses various bibliometric analysis methods: citation analysis, keyword co-occurrence mapping, analysis of bibliographic productivity and impact indicators. The bibliometric analysis software SciMAT was used to develop visualisations of the identified research trends. Following the methodological rigour of PRISMA, the analysis covers 329 publications from the Scopus database from 2004 to 2023.

Findings: Results illustrate the evolution of corporate value research in the context of sustainable development, its increasing importance, interactions, stability and changes in the research network. Recent topics include sustainability reporting as one of the key determinants of corporate value and the role of innovation in sustainable business models. Potential areas of research include sustainability reporting, corporate governance, and R&D. A lack of research on sectors other than

manufacturing and regions other than Central Europe is noted, suggesting interesting avenues for future investigation.

Implications/Recommendations: This study can be used as a reference point for researchers investigating the determinants of corporate value within the context of sustainability. It identifies key areas where further action is needed to raise managers' awareness and understanding of the critical relationship between corporate value and sustainability issues.

Contribution: The presented literature review is one of the first such comprehensive studies in this area to use big data analytics. It identifies evolutionary changes, recent trends and outlines new directions for future research.

Article type: original article.

Keywords: corporate value, sustainable development, literature review, bibliometric analysis.

JEL Classification: G32, Q56, M14, L21.

1. Introduction

Corporate value is a key topic in the field of corporate finance and management, as value maximisation is seen as the main objective of modern corporations and the ultimate criterion for decision-making (Rappaport, 1999; Hillman & Keim, 2001). Scientific discussion is held on the definition of corporate value (Ramakrishnan & Thomas, 1992; Kyriazis & Anastassis, 2007) and its importance for shareholders (Rappaport, 1999; Lazonick & O'Sullivan, 2000), and other stakeholders (Freeman, 1998; Hillman & Keim, 2001; Jiao, 2010). It is linked to a variety of measures and valuation methods (Ramakrishnan & Thomas, 1992; Kyriazis & Anastassis, 2007). Many studies discuss the value creation process (Rappaport, 1999; Adams, 2017) and its determinants (Fama & French, 1998; Krause & Tse, 2016; Qiu *et al*., 2021).

A relatively new stream of literature links corporate value to sustainability issues: corporate social responsibility (CSR) (D'Amato & Falivena, 2020), environmental, social, governance (ESG) performance (Fatemi, Glaum & Kaiser, 2018; Wong *et al*., 2021), and sustainability reporting in connection to sustainable development goals (SDGs) (Krasodomska, Zarzycka & Zieniuk, 2024). The link between corporate value and sustainability is discussed. Most of the studies provide evidence of a positive relationship between corporate value and sustainability (e.g., Menz, 2010; Kuzey & Uyar, 2017). Yet, another group of studies supports the theory of value destruction, suggesting that managers may achieve SDGs at the expense of shareholders (e.g., Miralles-Quiros, Miralles-Quiros & Arraiano, 2017; Swarnapali & Le, 2018). Finally, some studies find no significant relationship between firm value and sustainability performance (Rudkin & Cai, 2019; Qing & Jin, 2023). Therefore, as the results are inconclusive, one may expect further studies in this field.

Understanding the importance to businesses of achieving sustainable development goals (Mio, Panfilo & Blundo, 2020), this paper aims to synthesise the extant literature and evolution of research on corporate value in the context of sustainability over the past two decades. The main objective of this paper is achieved by conducting a conceptual science mapping analysis of the extant research in this field, which aims to seek answers to the following research questions:

RQ1: What topics have so far dominated the enquiries of researchers analysing sustainable development related to corporate value, and what have they found?

RQ2: How has the volume of research on sustainable development and corporate value changed over time, and what factors are associated with this growth?

RQ3: What new themes are currently emerging in the literature on sustainability and corporate value?

These questions serve as a starting point for a bibliometric analysis to gain a deeper understanding of the scientific landscape around corporate value in the context of sustainable development. The rest of this paper is structured as follows: section 2 outlines SciMAT methodology and functionality; section 3 discusses mapping results; the final section concludes the study.

2. Methodology

2.1. Conceptual Research Design

As indicated in section 1, this paper aims to synthesise the extant literature and the evolution of research on corporate value in the context of sustainable development over the past two decades. The importance of this topic is highlighted by numerous literature review papers published recently (Mio, Panfilo & Blundo, 2020; Pizzi *et al*., 2020; Berrone *et al*., 2023). This paper falls into this stream of studies by adding value due to a different scope of analysis (evolution of research on corporate value in the context of sustainable development) and a different methodological approach (by using SciMAT software).

In this study, a variety of bibliometric analysis tools is used. In the pre-mapping phase (after preparing the relevant dataset), a temporal analysis and selected productivity and impact indicators were applied. Strategy diagrams resulting from co-word analysis graphically illustrate the themes of current research, emerging themes and potential trends for future research. The evolution map visualises the development of corporate value research in the context of sustainability.

2.2. Data Collection and Selection

The dataset of bibliographic records of publications on corporate value and sustainable development was created using data from Scopus. The study focused on a single database because, as demonstrated by Harzing and Alakangas (2016),

the simultaneous use of multiple databases does not increase the number of relevant records subject to further analysis. The search was conducted according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines (Page *et al*., 2021) (Fig. 1).

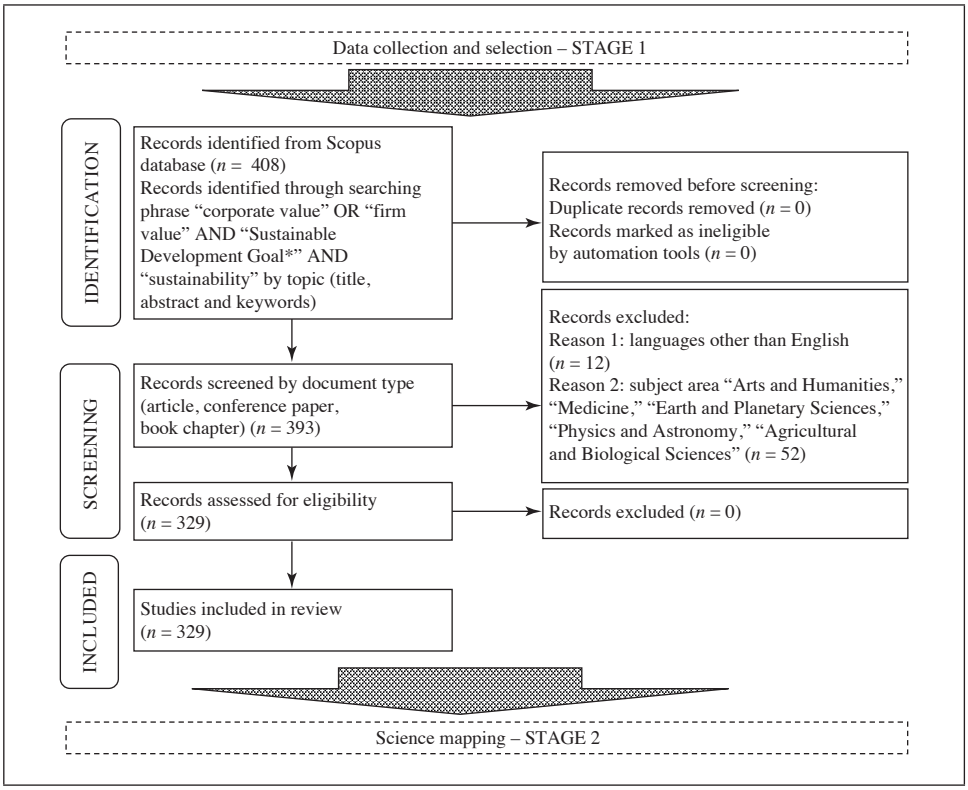

Fig. 1. Search for Research on Corporate Value in the Context of Sustainable Development in the Academic Literature – PRISMA Flow Diagram (Research Process – Stage 1)

Source: the authors.

All publications meeting the search conditions were included in the dataset, without limiting the dataset to full years.[1] The search used the phrases "corporate value" OR "firm value" in the titles, abstracts and keywords of the publications, and phrases "Sustainable Development Goal*" AND "sustainability" in similar criteria,[2]

[1] The analysis was conducted in November 2023. Publications from 2023 were deliberately included due to dynamic changes in the field, with 2021–2023 distinguished as a separate sub-period.

[2] Critics may argue that excluding terms like "sustainable development" results in a loss of specificity, but using broader terms like "sustainability," allows for capturing interdisciplinary

both occurring simultaneously. The search identified 408 academic articles, later filtered by document type (research articles, conference proceedings, book chapters) and publication language (English). After expert review, 52 publications unrelated to the subject were excluded, resulting in 329 records.

2.3. Science Mapping

The scientific mapping process is divided into two sub-stages. In the pre--mapping phase, the prepared dataset was subjected to a temporal and citation analysis with the application of tools available in the Scopus database. In the principal mapping phase, the acquired dataset was analysed using SciMAT (v1.1.04), which is an open-source software tool developed to perform science mapping analysis within a longitudinal framework (Cobo *et al*., 2011, 2012; Moral-Muñoz *et al*., 2020).

SciMAT has been validated for its robust capacity to map thematic evolution and elucidate conceptual connections in research using co-word and bibliographic coupling techniques. Studies (Cobo *et al*., 2012) demonstrated its effectiveness in identifying recurring themes based on empirical data. SciMAT's longitudinal analysis elucidates the evolution of core ideas and emerging trends, underscoring its methodological robustness (Ji *et al*., 2023). Furthermore, SciMAT's standardised workflows and visualisations facilitate replicability and reduce researcher bias (Pessin, Yamane & Siman, 2022). Despite challenges in keyword selection, SciMAT balances inclusivity and focus to maintain analytical clarity (Moral-Muñoz *et al*., 2020), making it a key tool for mapping research landscapes.

Although the most commonly used bibliometric mapping tools are VOSviewer, CiteSpace and Bibliometrix (Tomaszewski, 2023), the SciMAT was applied in this study due to its data processing capabilities and functionality enabling the evolutionary research.

In this study, the approach presented by Cobo *et al*. (2011) is adopted and applied in a similar way to previous studies by Sánchez-Teba *et al*. (2021), however the subject and scope of analysis is different. The longitudinal mapping analysis of research on the corporate value and sustainability nexus was conducted, focusing on finding relationships through a multi-faceted analysis of keyword co-occurrence. Following Cobo *et al*. (2011), the adopted approach included four steps. Steps 1 (detection of sub-structures) and 2 (clustering) use centrality and density measures. These measures allow visualisation of the research results by using thematic

perspectives and emergent insights (Ji *et al*., 2023). Recurring themes across subperiods reflect their ongoing relevance, not redundancy (Karakose *et al*., 2024).

Table 1. Mapping Measures

Step	Measure	Formula	Interpretation
1	Centrality measure	$c = 10 \cdot \sum e_{uv}$ where: c – centrality u – an item belonging to the cluster v – an item belonging to other clusters	c – assesses the external coherence of the network by measuring the degree to which the network interacts with other networks. In its raw form, c has no fixed upper limit because it grows with the number and strength of connections $\left(\sum e_{uv}\right)$. After normalisation, c is scaled between 0 and 1: – 0 – the cluster is completely isolated from other clusters (no inter-cluster connections) – 1 – maximum interaction, meaning all connections of the cluster lead to nodes in other clusters
2	Density measure	$d = 100\frac{\sum e_{ij}}{n}$ where: d – density i, j – items belonging to the cluster n – the number of items in the theme	d – assesses the internal coherence of the network by measuring its internal strength. It ranges from 0 to 100: – higher values, greater coherence or stronger interconnectedness within the network – 0 – there are no connections between items in the cluster, a lack of internal coherence – 100 – a fully connected network, every item is directly linked to every other item (maximum internal strength)
3	Equivalence index	$E_{ij} = \frac{C_{ij}^2}{C_i \cdot C_j}$ where: E_{ij} – the equivalence index $i, j, \ldots$ – keywords C_i – the number of occurrences of the keyword i C_j – the number of occurrences of the keyword j C_{ij} – the number of co-occurrences of the keywords i and j	E – identifies the similarity between keywords. It ranges from 0 to 1: – 0 – no co-occurrence (no similarity) between the two keywords – 1 – perfect similarity, whenever one keyword occurs, the other always does as well

Table 1 cnt'd

Step	Measure	Formula	Interpretation
4	Stability index	$S_{ij} = \frac{n_{t1t2}}{n_{t1} + n_{t2} - n_{t1t2}}$ where: S_{ij} – the stability index $t_1, t_2, \ldots$ – periods n_{t1} – the number of keywords related to period t_1 n_{t2} – the number of keywords related to period t_2 n_{t1t2} – the number of keywords shared by periods t_1 and t_2	S – assesses the degree of stability between two consecutive periods. It ranges from 0 to 1: – the closer to 1, the more consistent and stable the thematic elements are over time – 0 – complete instability, where there are no shared keywords between the two periods, a lack of continuity in thematic or conceptual focus – 1 – complete stability, all keywords from t_1 are retained in t_2 and vice versa, full thematic consistency across the periods

Source: the authors based on Cobo *et al*. (2011), Callon, Courtial & Laville (1991).

networks[3] and two-dimensional strategy diagrams.[4] Steps 3 (analysis of the evolution) and 4 (performance analysis) use the equivalence (Callon, Courtial & Laville, 1991) and stability measures (Cobo *et al*., 2011). Detailed description in Table 1.

These measures allow the creation of an overlay diagram[5] and a thematic evolution map[6] presented in section 3.2.

3. Results

3.1. Results of the Pre-mapping

As a result of the temporal analysis (distribution of publications and their citation rates) three stages of the evolution of research on corporate value in the context of sustainable development were distinguished (Fig. 2).

Changes in the annual number of scientific works and citations are considered important indicators for observing the development trend of a research field (Zou, Yue & Vu, 2018).

The first papers in this field indexed in the Scopus database are from 2004. However, until 2014, the annual number of publications addressing corporate value in the context of sustainable development was fewer than 10. The number of citations per year in this period was fewer than 60. Therefore, the authors refer to this period as "the emergence stage" (EME_Stage). During this period, interest in sustainability issues was slowly growing due to the implementation of the Millennium Development Goals (MDGs) introduced by the United Nations (UN) in 2001.

Between 2015 and 2018 the annual number of publications and their citations more than tripled. Therefore, the authors refer to this period as the strengthening stage (STR_Stage). For analytical reasons (correctness of the analysis using SciMAT), this phase was divided into 2 two-year sub-periods covering the years: 2015–2016 and 2017–2018.[7]

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[3] Thematic networks represent the interrelationship of keywords in the form of circles of different sizes linked by lines of equal thickness. Each thematic network is labelled with the name of the most important "central" keyword of the topic. The size of the circles is proportional to the number of documents corresponding to each keyword, and the thickness of the lines between two circles "i" and "j" is proportional to the equivalence index (Cobo *et al*., 2011).

[4] A strategic diagram is a two-dimensional space obtained by plotting themes according to their measures of centrality and density (Cobo *et al*., 2011).

[5] Overlay graphs demonstrate the continuity and stability of the domain by presenting changes between consecutive periods. Stability is determined by a stability index (usually measured with the Jaccard index) (Cobo *et al*., 2011).

[6] A thematic evolution map illustrates the evolution of the clusters and the transitional and new elements of each period, as well as the elements shared by two successive periods.

[7] This approach stems from the recommendations to conduct analysis either for a similar number of elements (publications) in each sub-period or for periods of similar length.

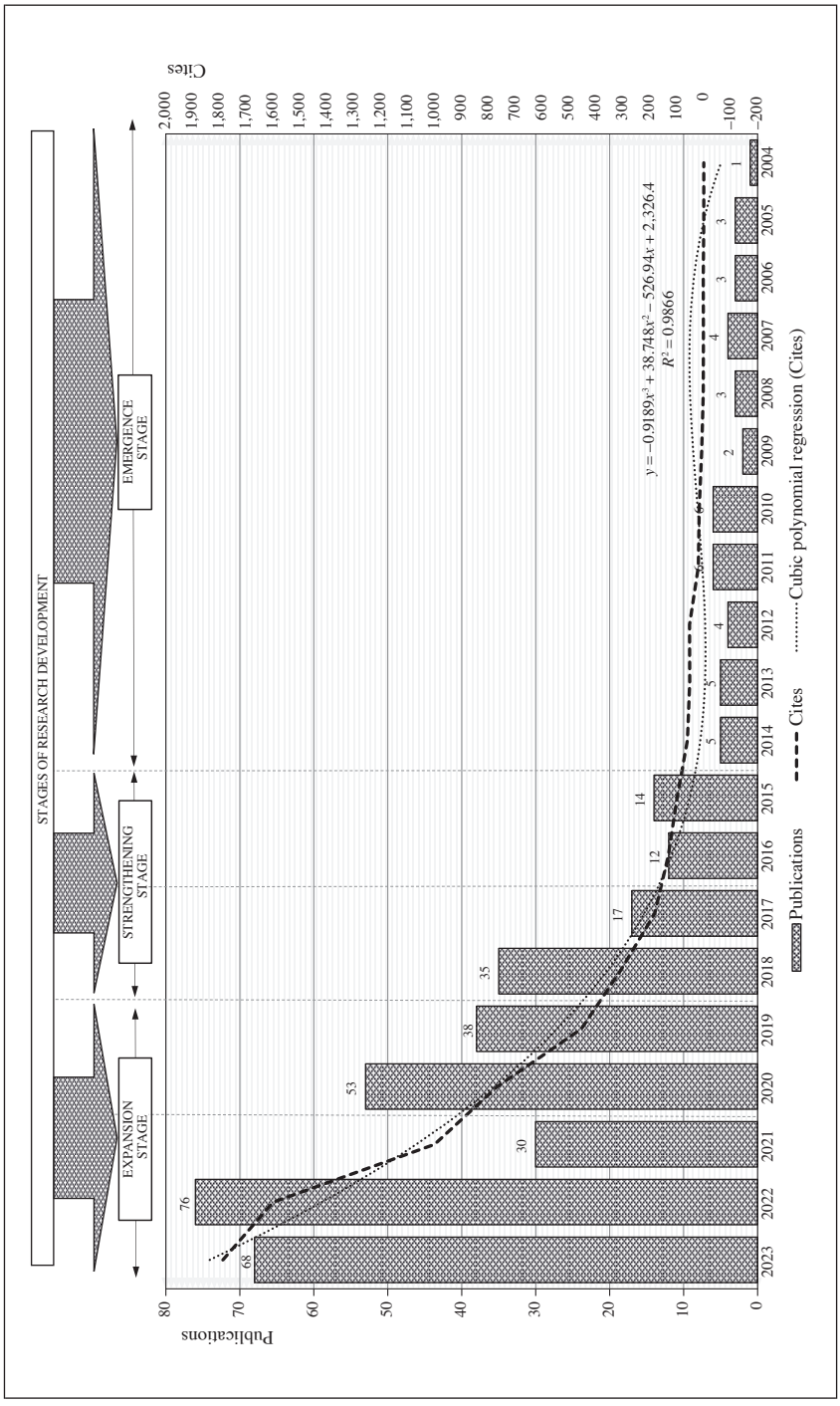


Fig. 2. Research Timeline on Corporate Value in the Context of Sustainable Development
Source: the authors.

The dynamic increase in the public interest in sustainability issues during this period is linked to the adoption of The UN 2030 Agenda for Sustainable Development in 2015 and the introduction of the Non-financial Reporting Directive (NFRD) in 2017.

Between 2019 and 2023 the annual number of publications and citations more than doubled. Therefore, the authors refer to this period as the expansion stage (EXP_Stage). Similarly to the previous phase, for analytical reasons, this one was divided into 2 two-year sub-periods covering years: 2019–2020 and 2021–2023. During this period key regulations were introduced, which led to the increasing importance of sustainability issues for businesses: the European Green Deal in 2019, the European Taxonomy in 2020, the Sustainable Finance Disclosure Regulation in 2021, and the Corporate Sustainability Reporting Directive in 2023.

Consequently, the dynamic increase in the number of research works on corporate value and sustainability issues observed in the analysed period corresponds to the growing public interest in sustainable development, the number of new regulations and obligations for businesses, financial institutions and investors, as well as the scale of international initiatives and partnerships created to promote sustainable development.

3.2. Results of the Principal Mapping

The Overlay Graph and Thematic Evolution Map

First, the overlay diagram was used to assess the stability of the development of research on corporate value in the context of sustainable development. A combination of this general overview with a thematic evolution map provides insight into research development in this field from its emergence (Fig. 3).

The thematic evolution map shows the increasing number of themes and keywords, used over multiple periods, illustrating the growing complexity and relevance of this research field, particularly in subperiods 4 and 5. The stability index (growing from 0.2 to 0.52) indicates the development of specialised knowledge.

In the first period (2004–2014), three main themes emerged (representing 12.46% of the studies), with "sustainable development" reappearing later. The themes "CSR" and "investment" have strong links with the themes of the second sub-period, while they are still present in the third sub-period.

In 2015–2016, three new themes appeared (accounting for 7.9% of the studies), with "sustainability" continuing in later periods. The others disappear and only one of them "corporate governance" is linked to the following sub-period. In the third period (2017–2018), three new main themes emerged (accounting for 15.19% of the studies), related to corporate reporting. In 2019–2020, four more main themes emerged from the "sustainability" theme (accounting for 27.36% of all works). Research on this topic was developed from an "industrial" and "R&D" perspective.

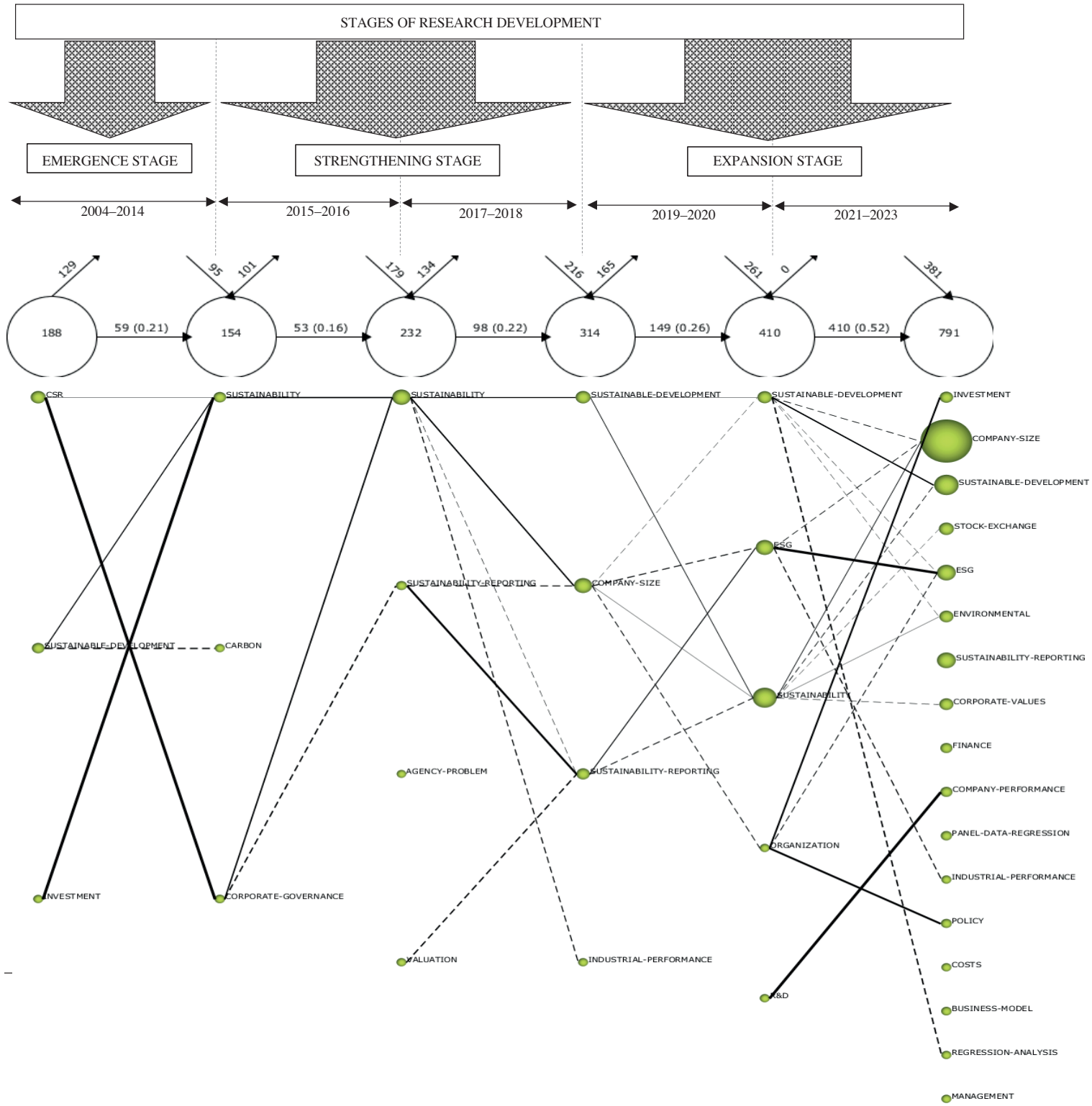


Fig. 3. Thematic Evolution Map with Overlay Graph

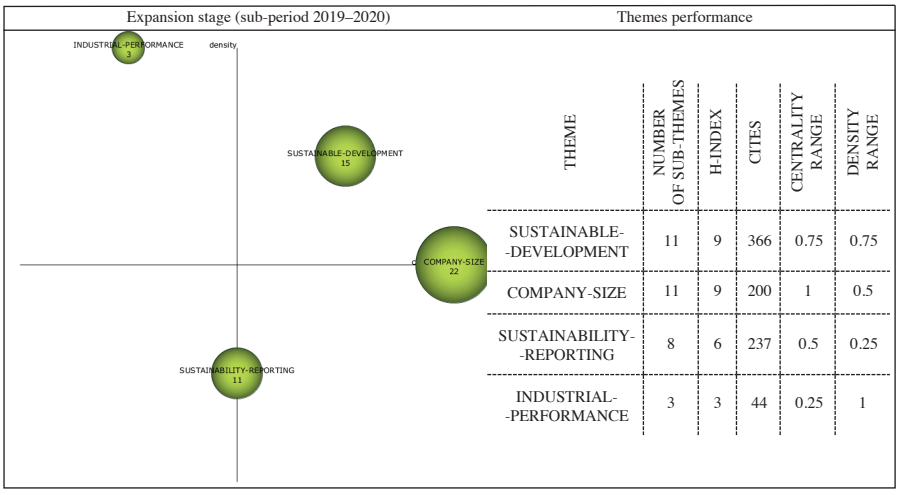
Source: the authors, using SciMAT.

In the last period (2021–2023), ESG issues become more important, in the context of "corporate governance." It should be noted that the topic of "corporate value" is seen as complementary to the main sustainability topics throughout the period. This further supports the conclusion that the issue of corporate value in the context of sustainable development is in an evolutionary phase and should be emphasised among the emerging topics: "finance," "management," "business model" and "costs." While, "investment," "policy" and "esg" themes remained underdeveloped.

Detection of Research Themes (Expansion Stage)

Using the functionality of the SciMAT software we categorise themes identified through keyword co-occurrence analysis. Based on their centrality and density measures, the research themes were grouped into four categories: 1) motor (leading) themes (upper right quadrant (Q1), well-developed and important for the field), 2) highly developed and isolated themes (upper left quadrant (Q2), well-developed but peripheral areas of research), 3) emerging and declining themes (lower left quadrant (Q3), underdeveloped or irrelevant topics, may be developed and become relevant in the next period or disappear) and 4) basic and transversal themes (lower right quadrant (Q4), relevant for the field but not well developed yet, quite general).

As discussed in section 3.1, research on corporate value and sustainability has been developed intensively in recent years. Therefore, further considerations will focus on observing its development over the last five years: 2019–2023.



Themes performance

THEME	NUMBER OF SUB-THEMES	H-INDEX	CITES	CENTRALITY RANGE	DENSITY RANGE
SUSTAINABLE--DEVELOPMENT	11	9	366	0.75	0.75
COMPANY-SIZE	11	9	200	1	0.5
SUSTAINABILITY--REPORTING	8	6	237	0.5	0.25
INDUSTRIAL--PERFORMANCE	3	3	44	0.25	1

Fig. 4. Strategy Diagram and Performance Analysis for the Expansion Stage (Sub-period 2019–2020)

Source: the authors, using SciMAT.

In the first sub-period of the expansion stage (2019–2020), four streams of research were identified. The motor themes include: "sustainable development" and "company-size." The "industrial-performance" studies were classified as peripheral, highly specialised topics, while the "sustainability reporting" issues proved to be important but underdeveloped (Fig. 4–6).

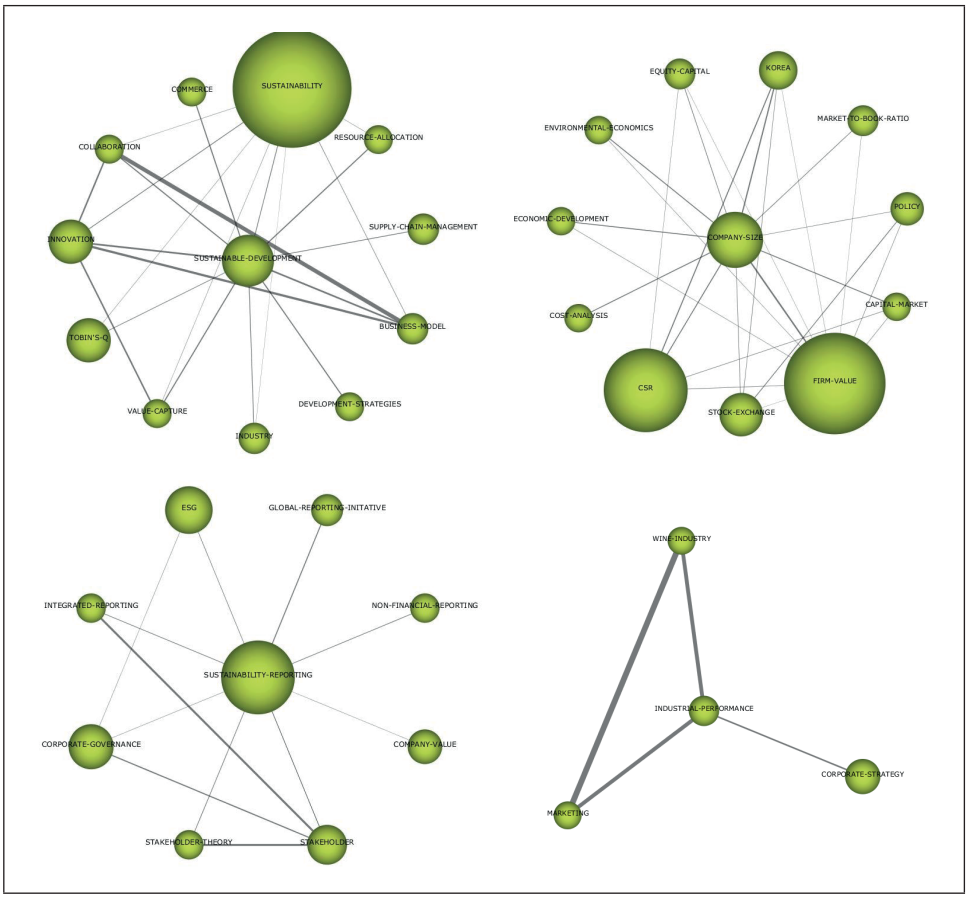


Fig. 5. Thematic Network Structures for the Expansion Stage (Sub-period 2019–2020)
Source: the authors, using SciMAT.

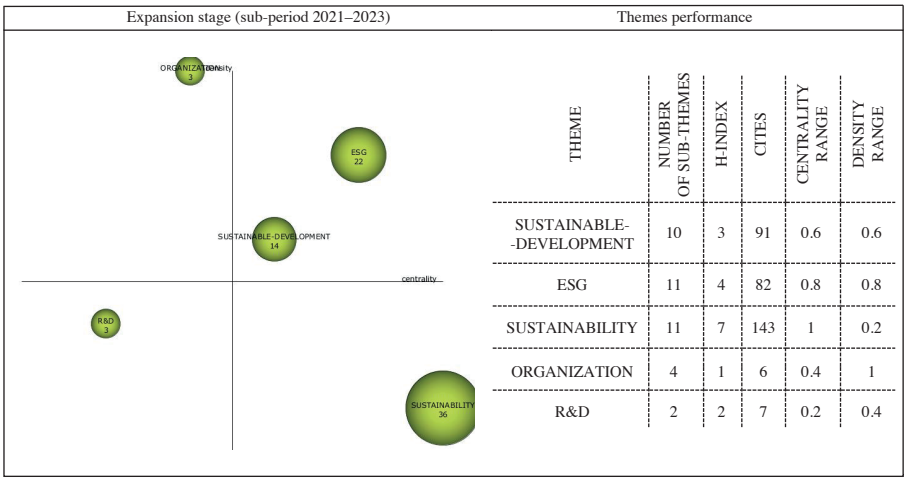
The main sub-themes for "sustainable development" are: "industry" and "commerce," which indicate the types of analysed sectors, and sub-themes directly related to company value: "value capture" and "Tobin's Q." The second leading theme is "company size," with the main sub-themes being "company value" and "CSR," "capital market," "stock exchange," "equity" and "market value to book

value." This shows how capital market investors view the value of a company in the context of sustainability.

The most important sub-themes for "industrial performance" issues identified as a peripheral theme are: "corporate strategy" and "marketing."

The topic of "sustainability reporting" is quite important as a general topic, but still underdeveloped. It is built up, *inter alia*, of sub-themes related to reporting: "non-financial reporting," "integrated reporting" and "global reporting initiative" illustrating the increasing importance of these topics during this period, following the implementation of NFRD in the European Union. This issue is analysed in a study by Qureshi *et al*. (2020). They observed a positive relationship between sustainability disclosure, board gender diversity, and firm value. On the other hand, Tamayo-Torres, Gutierrez-Gutierrez and Ruiz-Moreno (2019) analysed ESG performance and found a positive relationship between governance performance (G) and market value; a negative relationship between social performance (S) and market value and a nonsignificant relationship between environmental performance (E) and market value. This mixed evidence opens avenues for further research.

In the second sub-period of the expansion stage (2021–2023), five streams of research were identified. The motor themes include: "ESG" and "sustainable development." The organisation-related studies were classified as peripheral, highly specialised topics, while the sustainability-related studies proved to be transversal themes. The emerging themes concentrated on the R&D-related research (Fig. 6–7).



Themes performance

THEME	NUMBER OF SUB-THEMES	H-INDEX	CITES	CENTRALITY RANGE	DENSITY RANGE
SUSTAINABLE--DEVELOPMENT	10	3	91	0.6	0.6
ESG	11	4	82	0.8	0.8
SUSTAINABILITY	11	7	143	1	0.2
ORGANIZATION	4	1	6	0.4	1
R&D	2	2	7	0.2	0.4

Fig. 6. Strategy Diagram and Performance Analysis for the Expansion Stage (Sub-period 2021–2023)

Source: the authors, using SciMAT.

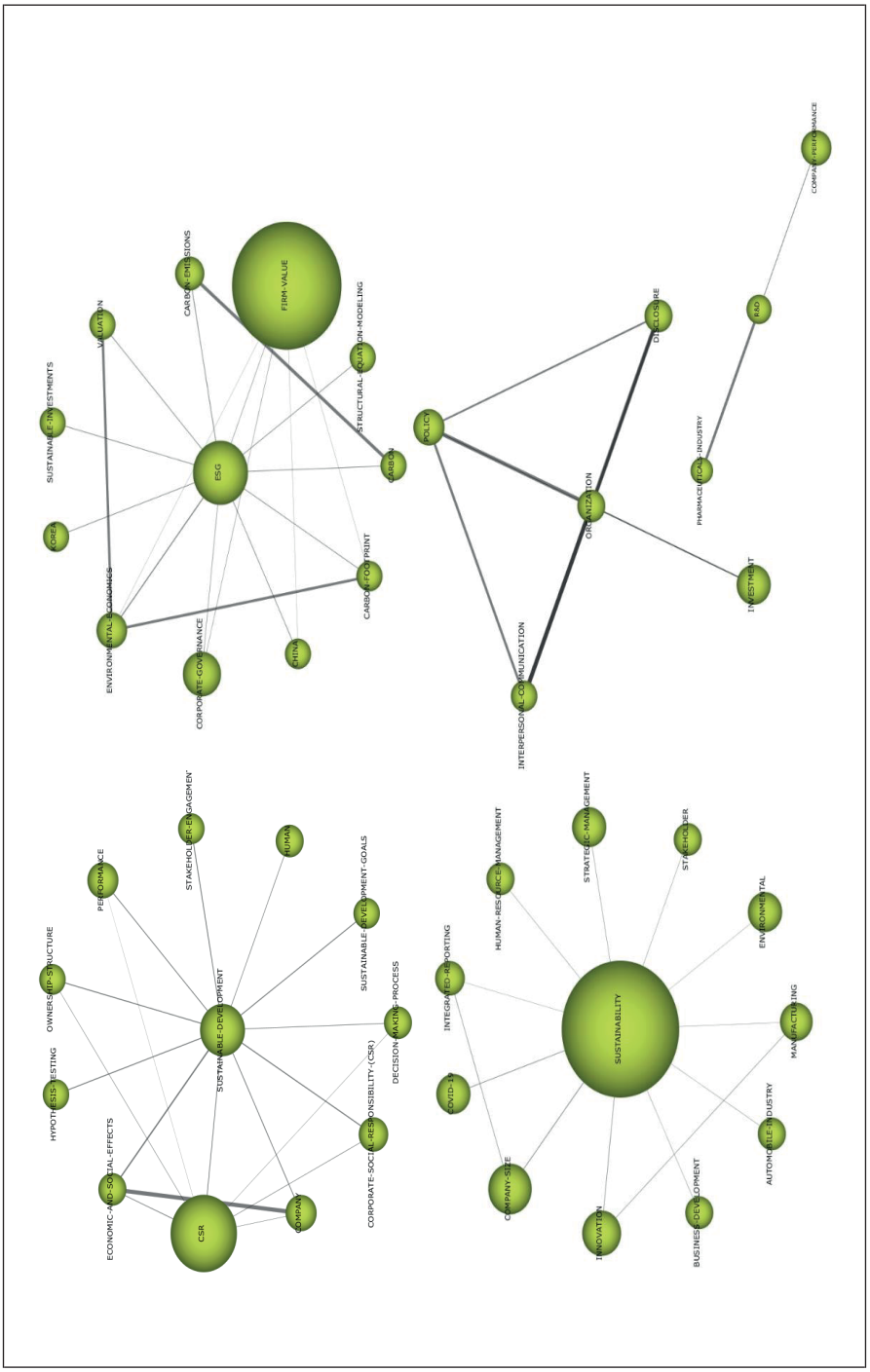


Fig. 7. Thematic Network Structures for the Expansion Stage (Sub-period 2021–2023)
Source: the authors, using SciMAT.

ESG theme as the leading topic is represented by 22 papers and consists of 11 subthemes, with "firm value" as the dominant one. The remaining subthemes are related to particular ESG components, others indicate the research method and the geographical scope of research.

The second leading topic is "sustainable development" represented by 14 papers, consisting of 10 subthemes, with CSR as the major one. The strongest link is identified between "company" and "economic and social effects."

The general theme is "sustainability" represented by 36 documents and 11 subthemes, with "innovation" and "integrated reporting" as the major subthemes. Two subthemes indicate sectors of analysis and one subtheme is related to the consequences of the COVID-19 pandemic.

The corporate value topic was studied by many researchers during this period. Bofinger, Heyden and Rock (2022) found that a firm's ESG profile affects its valuation. It suggests that ESG performance may increase the transparency of the company and reduce the negative consequences of asymmetric information. Zumente and Bistrova (2021) found that both financial and non-financial factors related to ESG performance are important for long-term value, including reputation, stakeholder trust and employee satisfaction. Govindan *et al*. (2021) found that diffused ownership improves social performance, while board diversity is positively associated with overall CSR and governance performance. However, they found no significant positive results for the value relevance of CSR performance.

4. Conclusion

This study provides a pioneering analysis of existing research on corporate value in the context of sustainability, representing the first attempt to present a structured conceptual framework. The examination of 329 articles published in 2004–2023 identified three main phases of development, subdivided into five periods. The results of the bibliometric analysis provide evidence for the growing interest in the research field, with emerging topics linked to sustainable reporting, R&D and corporate governance. The number of publications rose from fewer than 10 papers per year in the first sub-period, to over 70 papers per year for the most recent sub-period (2018–2023).

The main limitations of this study stem from the research method. Only one synonym per primary keyword was used in the Scopus dataset, which may have influenced the dataset's content. Other parameters and the SciMAT software's procedures, such as different similarity measures and clustering algorithms, also affect the results. Visualisation and performance analysis results are determined by the choice of analysis parameters. Variations in these parameters may provide ideas for other researchers exploring this field of study.

This study can be used as a reference point for researchers focusing on the determinants of corporate value in the context of sustainability. As for practical implications, the study identifies areas of knowledge in which actions would be required to raise managers' awareness and understanding of the relationship between corporate value and sustainability issues.

Authors' Contribution

The authors' individual contribution is as follows: Each contributed 50%.

Conflict of Interest

The authors declare no conflict of interest.

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