

ESG AND VENTURE CAPITAL RESEARCH: A BIBLIOMETRIC LITERATURE REVIEW AT THE INTERSECTION OF TWO FIELDS

Cristina De Silva ^{*}, Andrea Odille Bosio ^{**}, Anna Gervasoni ^{***}

^{*} Corresponding author, Department of Economics and Management, Università Cattaneo — LIUC, Castellanza, Italy
Contact details: Università Cattaneo — LIUC, Corso G. Matteotti, 22, 21053 Castellanza (VA), Italy

^{**} Department of Management, Economics and Industrial Engineering (DIG), Politecnico di Milano, Milan, Italy

^{***} Department of Economics and Management, Università Cattaneo — LIUC, Castellanza, Italy



Abstract

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In recent years, there has been a growing interest in concepts of *ESG* (environmental, social, governance), *SRI* (socially responsible investing), and *Impact investing* among academics and practitioners. This increased attention can be attributed to the notable support from institutional investors and policymakers who are pushing for more sustainable and socially responsible investment practices. This change poses many challenges and offers great opportunities to the venture capital (VC) sector, as it will define the new standard for investments. Against this backdrop, the paper aims to analyse the nascent body of literature at the intersection between the research field of “ESG” and “venture capital”, using a bibliometric literature review. The results highlight the key groundwork and future research directions for academics. We show the need to integrate these new practices in a comprehensive framework. Our findings aim to support practitioners and policymakers, as we synthesize the key literature, authors, and themes of the academic debate working specifically in this interdisciplinary field.

Keywords: Venture Capital, ESG, Impact Investing, Startups, Sustainability, Sustainable Development

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1. INTRODUCTION

In the last years, there has been a significant increase in the adoption of sustainability principles that emphasize the careful evaluation of the environmental, social, and governance (ESG) impacts of economic activities. Specifically, it forms the criteria for running private and public organizations responsibly and sustainably. This approach considers the intergenerational perspective and prioritizes long-term goals, aiming to ensure that current practices do not compromise the well-being of future generations. This quickly became

a trend embraced by both policymakers and practitioners, especially in the European region, and it started to be standardized from a regulatory standpoint (World Commission on Environment and Development [WCED], 1987).

The sustainable investing industry and the financial services industry have been greatly impacted by international actions such as the Paris Agreement, the Sustainable Development Goals (SDGs), the Task Force on Climate-related Financial Disclosures, the United Nations Environment Program Finance Initiative (UNEP FI) and Sustainable Finance Roadmap initiative (“Global Compact”, 2022).

According to the Global Sustainable Investment Review 2022 as of the beginning of 2020, sustainable investment on a global scale had reached \$30.3 trillion across the five primary markets (Europe, United States [US], Canada, Japan, and Australasia), representing 15% rise in the past two years (2018–2020) and a 55% increase over the past four years (2016–2020) (Global Sustainable Investment Alliance [GSIA], 2023, p. 10).

As Rodriguez-Rojas et al. (2022) pointed out, these sustainability challenges are becoming increasingly important for companies, their clients, and external stakeholders in the long-term strategy. This is due to the rising demand for natural resources, economic inequality, and climate change.

In this context, sustainable finance is expected to have a key role in persuading companies to include ESG and standardize best practices (European Fund and Asset Management Association [EFAMA], 2018).

To operationalize these goals, new ventures are often seen as a solution to various social and environmental challenges (Hall et al., 2010; Pacheco et al., 2010; Seebode et al., 2012). In this, venture capital (VC) represents an essential financial intermediary for financing entrepreneurial solutions and the new generation of highly innovative firms. VC can be considered a crucial factor in fostering the growth of sustainable businesses (Bürer & Wüstenhagen, 2009), which can make positive contributions to both the environment and society while also generating higher profits (Bocken, 2015). Such definitions highlight the investor's characteristic focus on medium to long-term investments, known as "patient capital", and their hands-on approach that provides support to companies with their expertise.

The role of VC is a subject of considerable academic discussion, particularly regarding its potential as a facilitator in achieving long-term sustainability goals and its advocacy for efficient ESG practices. This topic spans two distinct research realms: corporate finance studies on VC and investigations into sustainability-related issues and technical aspects. The integration of ESG principles aligns with the primary objectives of VC and private equity investments, aiming to maximize investor capital and shareholder returns. Considering this, business owners, startup founders, and VC firms are encouraged to enhance their profitability prospects by adopting ESG-compliant business and investment models. This approach not only contributes to financial success but also addresses broader concerns related to sustainability and responsible business practices.

The analysis of this nascent research field is essential to veterans and new researchers of both fields. Specifically, we started witnessing a dynamic process of knowledge sharing between the two fields, which needs to be mapped to assess the quality contributions and synthesize the produced knowledge. The final objective of this study is, therefore, to create a science mapping of the bibliographical network in the realm of VC and ESG research, analyzing collaboration patterns, research themes, and trends.

According to this, the first objective of this study is to present a performance analysis of the new research field connecting VC and ESG research, including the fields' primary contributors.

A performance analysis is quite common among literature review studies (Donthu et al., 2021).

Specifically, the paper addresses the following research questions:

RQ1: What are the publication patterns in the field of venture capital and ESG?

RQ2: Who are the most prolific contributors to the new research field of venture capital and ESG?

RQ3: Which are the most cited articles in the fields of venture capital and ESG?

By examining collaboration patterns within this field, we can gain valuable insights into its research landscape, because the social structures created by collaborations play a crucial role in the development of the field. For example, group A may be pursuing a different subsection of VC or private equity and ESG research than group B. It is then interesting to analyze how both groups interact with one another, as well as which group is more prolific in the field.

In addition to analyzing collaboration patterns, this study also focuses on thematic analysis, which is a critical component of any review as it focuses on the content of the studies themselves. By identifying different thematic clusters within the entire field of VC and ESG research, as well as in more recent publications (Chalissery, 2023), this study aims to identify the key themes that have emerged in the field's research and how they have evolved over time.

We thus present the final four research questions:

RQ4: What are the foundational themes in the fields of venture capital and ESG research, and what are the ways forward for the fields?

RQ5: What are the collaboration patterns in the fields of venture capital and ESG research?

RQ6: Which are the main path articles in the fields of venture capital and ESG research?

RQ7: What have been the main hot topics over time in the fields of venture capital and ESG research?

This study can help academic researchers and professionals of both fields, as well as newcomers, to identify efficiently specific main research topics of interest, and key papers, and understand how they relate to the broader landscape of ESG and VC research. Differently from descriptive reviews, the bibliometric literature review relies on objective measures and algorithms to perform quantitative literature-based detection of emerging topics, based on the analysis of bibliometric networks of the data retrieved, such as citations and keywords networks. Thus, the present review detects thematic connections and overlapping areas among extant literature results and highlights uncovered issues deserving further attention, suggesting future research paths.

This research paper serves as a valuable resource for policymakers, offering nuanced insights into the relationship between VC and ESG goals, accompanied by a relevant list of academic papers that integrate ESG practices into VC operations and decision-making strategies. Moreover, it provides a foundation for informed policy decisions, identification of best practices, and the fostering of collaboration to effectively merge ESG considerations into the VC industry.

Finally, this paper's overall contribution and relevance to the academic fields also hinges on the better framing of newly published papers on this topic for experts in only one of the two fields. Recent studies in the literature (Cumming et al., 2023; Lin, 2021; Lange & Banadaki, 2023) imply

the knowledge of both the ESG and VC research fields, which may prove challenging for a reader who never delved into one of the two. Thus, this paper can be an essential guide to the main references and concepts emerging from this nascent body of literature at the intersection between the two fields, which will be analyzed in the next sections.

The remainder of the paper is structured as follows. Section 2 focuses on the literature review of VC and ESG, focusing on how these two research fields are important and provides a comprehensive analysis of the topic. Section 3 briefly describes the methodology adopted in the sample selection and the construction process is presented. Subsequently, results derived from bibliometric analysis are extensively discussed in Section 4. Finally, Section 5 summarizes comments on findings, together with recommendations for future research. Our research will have important implications for both academics and practitioners, by providing insights into the relationship between ESG rating and VC, and how this relationship can be leveraged to promote sustainable finance.

2. LITERATURE REVIEW

In recent years, academic discussions have placed growing emphasis on sustainability within the wider debate of corporate enterprises (Whiteman et al., 2013). As the financial markets grapple with challenges tied to sustainable development (Ziolo et al., 2021), scholars such as Mehrabi (2023) emphasize the pivotal role of key players in fostering sustainability within the financial sector, including policymakers, private investment funds, especially VC.

Notably, VC emerges as a key actor supporting the resilience of modern economies and their sustainable development (Breuer & Pinkwart, 2018). It plays a crucial role in nurturing companies by offering financial resources, expertise, and networking opportunities, empowering them to scale operations, broaden their impact, and catalyze positive changes across various industries (Bocken, 2015; Alareeni & Hamdan, 2020). As the primary source of entrepreneurial finance, VC has progressively integrated sustainability considerations into investment decisions and portfolio management. Beyond financial gains, Singhania et al. (2023) demonstrate how sustainable business prospects can fuel innovation and yield significant social and environmental impacts.

Moreover, sustainability considerations within VC extend to startups and entrepreneurship, attracting attention from prominent authors, such as Hockerts and Wüstenhagen (2010), who compared sustainable new entrants to incumbent firms, and Parrish (2010), who examined sustainability-driven entrepreneurship. Additionally, Mansouri and Momtaz (2022), considered how sustainability-orientated entrepreneurs may help resolve the great ESG challenges of our time, demonstrating that there is a positive effect on companies' initial valuation by VC investments, but a negative impact on the performance post-VC funding.

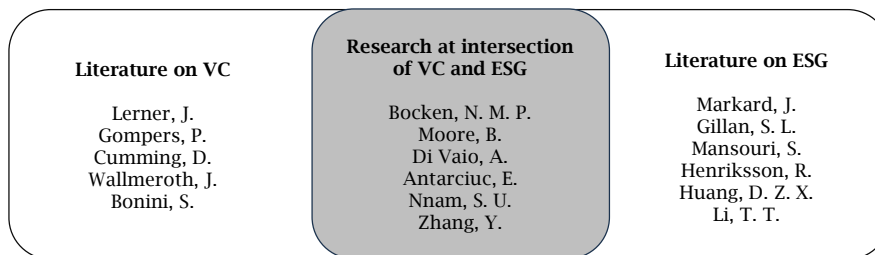
However, as shown by Lange and Banadaki (2023), VC perceives that ESG will play a major role in investment decisions in the long term. Specifically, venture capitalists experience greater advantages concerning the performance and commercialization of startups that integrate ESG aspects, contributing to the advancement of emerging technologies in achieving sustainability objectives. With smaller VCs increasingly prioritizing ESG factors, they articulate a distinct message that underscores the ethical and economic prudence of sustainability. These VC firms actively seek companies that embody the ethos of "doing well by doing good" (Aluchna & Idowu, 2017).

While the VC literature has been studied in recent years also through bibliometric literature reviews (e.g., Zhang et al., 2023; Cumming et al., 2023), its connections with the literature on ESG have yet to be tackled. Additionally, the literature review of Diaz-Rainey et al. (2017) underlines how sustainability and ESG research have been scant and disjoint in the overall finance field despite the major role it plays in the market. At the same time, the literature on ESG has been synthesized by many bibliometric literature reviews, which for their design did not take into consideration the connections with the finance field (Steblianskaia et al., 2023; Ribeiro & De Lima, 2023; Mishra & Kumar, 2023).

Therefore, to the best of our knowledge, our research is the first attempt to analyze the rises, falls, and interplays of the two research subareas, framing the exchange of crucial concepts between the two fields.

Indeed, we are exploring an emerging field of research that assesses this deep connection between the two fields. By identifying different thematic clusters, authors and publications, this study aims to identify the key themes that have emerged in the field and how they have evolved.

Figure 1. Conceptual framework of literature addressed by the research



Source: Authors' elaboration.

Figure 1 shows the conceptual framework of the body of literature investigated and the most prolific authors for each involved field. In

the subsequent analyses, our focus will primarily be on the authors featured within the grey section of the conceptual framework, to meet our research aim.

3. RESEARCH METHODOLOGY

The adopted bibliometric analysis is based on the guidelines of Donthu et al. (2021) and Mukherjee et al. (2022). This paper uses network analysis (NA) to better assess the impact and development of studies concerning the ESG theme within the VC body of literature. This bibliometric tool has been used as a superior methodology to the traditional literature review approaches by many scholars in several research fields, including early-stage financing and alternative investments (Zhang et al., 2023; Cumming et al., 2023) and the ESG (Steblianskaia et al., 2023; Ribeiro & De Lima, 2023; Mishra & Kumar, 2023). It lowers the interpretation biases and the limitations of the traditional approaches in analysing large bodies of work.

The methodology is composed of two stages. In the first phase, we set the scope of the analysis by choosing and testing the keywords, setting the period analysed, the type of documents included and their language to define the pool of articles (Denyer & Tranfield, 2009). In the second phase, we perform the bibliographic network analysis, discussing the key features of the network and clusters of articles. According to Donthu et al. (2021), the analysis considers the citation, keyword, and title networks.

The initial data utilized in this bibliometric analysis were obtained from the Scopus repository, which is one of the most relevant and used scientific databases for the field.

This first step sets the stage for the network analysis and follows the propositions of a traditional systematic literature review (SLR) (Kitchenham, 2004). In this process, the identification of the relevant keywords followed the same process used in SLRs (e.g., Tykvová, 2018; Wessendorf et al., 2019).

Several keywords of the research areas that fit the study objective were identified to filter the relevant articles. The tools of bibliographic analysis utilized use keywords to identify concepts, issues, and trends in the bibliographic network. Thus, keyword selection is a critical aspect of the review, affecting the overall result. The initial pool of keywords was refined through discussion and revision with a panel of experts, from both academic and professional backgrounds, to reduce personal bias and validate the findings.

Following the guidance of the cited papers, we used several software packages available to construct networks. The preliminary analysis was conducted using VOSviewer¹, for citation network visualization and more in-depth keyword network analysis. Additionally, it was used to create the input file for another software called Pajek², which required extracting the main path of the topic. These two software packages are complementary, and their main objective is to provide a variety of network layouts, including temporal visualization, keyword maps, and citation maps. Finally, a third software package had been adopted the Science of Science (Sci2) Tool³, developed for the temporal, geospatial, topical and network analysis of data sets. In more detail, it helps us to develop the process of keyword normalization and represents a good preparatory basis for the keyword analysis and burst analysis.

¹ <http://www.vosviewer.com/>

² <http://mrvar.fdv.uni-lj.si/pajek/>

³ <http://cns.iu.indiana.edu>

3.1. Scope of the analysis

In the first step, we defined the scope of analysis by developing the key research questions and following the main steps to clarify the output of the review.

Specifically, sustainable finance has a key role in persuading companies on sustainability, by including ESG as an integral part of the investment strategy to achieve sustainable goals.

We set the standard of sustainable finance according to the European Union (EU) policy: "Sustainable finance is understood as finance to support economic growth while reducing pressures on the environment... [and also] taking into account social and governance aspects" (European Commission, 2022).

It is important to highlight the relevance of VC industries, which in the last decades have represented the most important source of financing for sustainable companies and a main strategy for young or new ventures. ESG factors are the most used strategy adopted by companies and new ventures to achieve SDGs and to be more attractive to VC investors. Consistent with the research questions, set by the authors, this analysis will focus on research in the literature on the intersection between ESG factors and the VC industry.

3.2. Locating studies

Once we define the scope of this analysis, the second step consists of defining a set of search strings, based on abstract, topic, fields, and keywords. The initial stage of the analysis is crucial as the bibliographic review heavily relies on keywords to uncover important concepts, issues, and trends. The outcome of the analysis can vary significantly depending on the selected keywords. Therefore, we carefully selected keywords based on our previous experience and by referring to commonly used terms found in relevant articles within this field of study. The process of identifying relevant keywords followed the same methodology used in an SLR, as described by previous studies such as Wessendorf et al. (2019) and Tykvová (2018). After the initial selection of keywords, we refined them and created a shortlist for terms related to ESG and sustainability, after reviewing the pivotal papers (Khan, 2022) in the field of sustainable finance and discussion with experts in the area. The resulting keywords were "environmental social and governance performance", "corporate social responsibility disclosure", "ESG", "CSR", "sustainable development", "sustainable growth". Additionally, we referred to VC literature reviews (Cumming et al., 2023) to obtain the most relevant keywords for the VC field. We searched the keywords only in the title, abstract and keywords (coded in Scopus as TITLE-ABS-KEY). The enquiry was performed using only the Scopus database (the largest and most used abstract and citation database of peer-reviewed literature). Specifically, the set of identified keywords is "venture capital" OR "venture capitalist" OR "VC" AND "sustainable growth" OR "sustainable development" OR "ESG" OR "ESG investing" OR "environmental, social and governance" OR "CSR".

3.3. Study selection and evaluation

The search was performed on February 1, 2023. Without any restriction on the time window, we set several filtering criteria to guarantee the quality and relevance of the papers selected. This initial filtering criterion is based on the recommendation of several previous studies such as Ali et al. (2017), de Carvalho Pereira et al. (2015). Firstly, we chose to focus on research papers published in the fields of business, management and accounting, along with sustainability, as well as in journals such as the *Journal of Cleaner Production*, *Journal of*

Development Economics, and *Business Strategy and Environment*. This decision was made with the aim of conducting a bibliometric analysis from an economic and sustainable perspective. Secondly, we initially did not impose any restrictions on the publication year of the papers, allowing us to start our analysis from the beginning of the research field and include the latest and most up-to-date publications, thus enabling us to examine the dynamics of the field's evolution. Finally, we limited our selection to papers written only in the English language, which is the dominant language in these research areas. These filtering criteria are shown in Table 1.

Table 1. Inclusion criteria for study selection and evaluation

Inclusion criteria	Rationale
Published in peer-reviewed journals and conference proceedings	The field of interest is the academic one, as the peer-review process ensures the quality of the information.
Selection of papers of any publication year	In order to study the network dynamics and evolution of the field, the time window must be the widest possible.
Search fields of "Title-Abstract-Keywords"	In order to also include relevant papers which were missing one of the two key aspects in the indexing keywords.
Published in English	English is the dominant language in the corporate finance field.

Source: Authors' elaboration.

Hence, the selected keywords provide the opportunity to highlight distinct ideas, relevant concerns, and emerging patterns by leveraging the chosen methodology and its associated tools for analyzing the literature. This aligns with the stated aim of this study. This led to obtaining 357 works as a result of the search.

4. RESULTS AND ANALYSIS

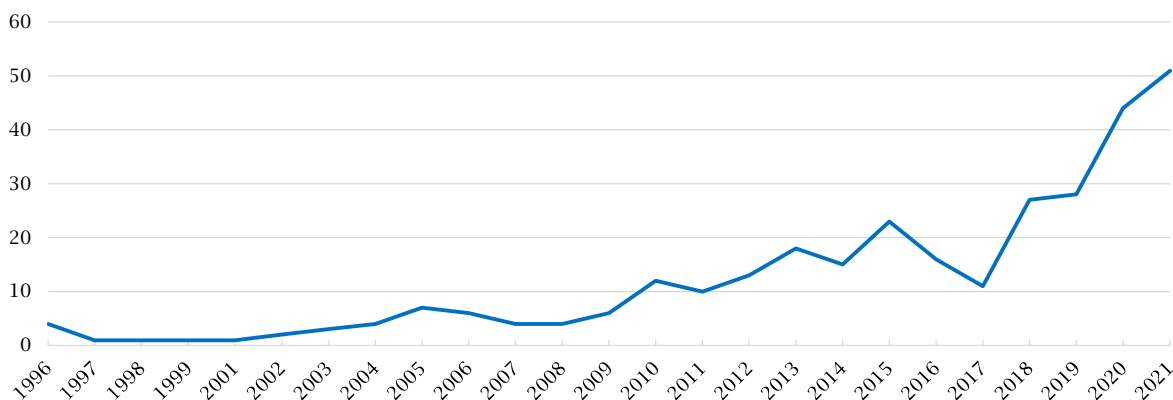
4.1. Descriptive analysis

Focusing on *RQ1*, Figure 2 shows the number of publications per year during our sample period, with the X-axis showing the years from 1996 to 2022, and the Y-axis showing the number of published researcher papers per year. The figure clearly shows that the ESG research trend has been increasing. The number of papers published was stable and rather low from 1996 to 2012, whereas researchers

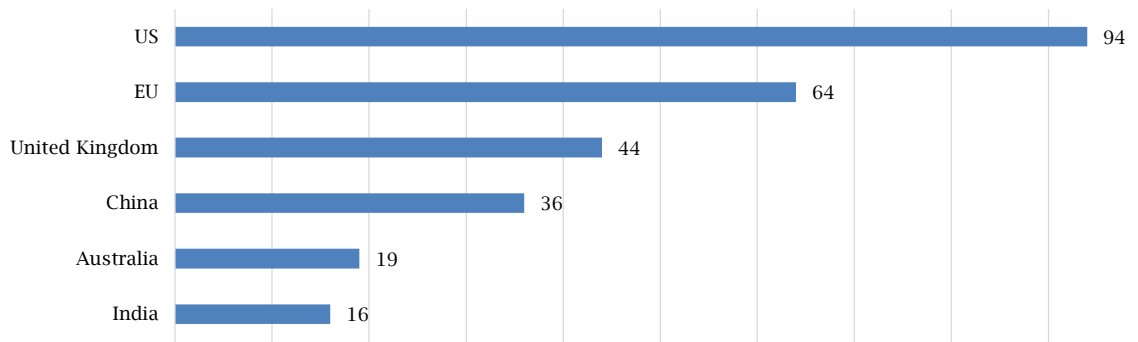
have steadily intensified their interest in ESG and sustainable investing since 2015, marking a turning point in worldwide economic history by signaling an urgent need for concrete change to achieve sustainable goals, with a significant increase over 2020 and 2021. During the years 2020 and 2021, a total of 44 and 51 papers rated as ABS3+ were published, respectively.

To answer *RQ2* and show the most prolific contributors to the new research field, we display in Figure 3 the nations with the greatest output of papers examining the intersection between ESG and the VC industry. The chart indicates that earlier studies predominantly concentrated on developed markets, with most of the research conducted by teams from developed countries, which could potentially aid in advancing the field. Nevertheless, researchers from emerging and frontier markets have yet to fully explore ESG and VC research.

Figure 2. Publication trend



Source: Authors' elaboration.

Figure 3. The first six influential countries by paper production

Source: Authors' elaboration.

Table 2 presents the list of top journals ranked according to the number of retrieved papers published in each of them. The top ten journals account for 54 papers, equal to 15% of the total retrieved contributions.

Table 2. The number of papers by source (top 10)

Journal	No.	Cite score 2021 (from Scopus)
Sustainability (Switzerland) (ISSN 2071-1050)	23	5.0
Journal of Cleaner Production (ISSN 1879-1786)	6	15.8
Energy Policy (ISSN 1873-6777)	4	12.4
Journal of Development Economics (ISSN 1872-6089)	4	6.4
Journal of Corporate Finance (ISSN 1872-6313)	3	5.4
Business Strategy and the Environment (ISSN 1099-0836)	3	11.9
Journal of Sustainable Finance & Investment (ISSN 2043-0795)	3	4.5
Journal Performance Apparel Markets (ISSN 1477-6456)	3	0.6
International Journal of Environmental Research and Public Health (ISSN 1660-4601)	3	4.5
Journal of Alternative Investments (ISSN 1520-3255)	2	2.2

Source: Authors' elaboration.

This shows that the field under study is not dominated by a single category of journals/disciplines.

Its spectrum spans several disciplines, including cleaner production, energy policy, business strategy, public health and development economics.

4.2. Bibliometric analysis

The citation network analysis (CNA) incorporated the 357 papers that were generated through the SLR, to examine the process of knowledge creation, transfer, and development in the realm of ESG and VC investments.

4.2.1. Authors' citation network analysis

We study both the Global Citation Score (GCS) and Local Citation Score (LCS) to answer RQ3 and hence identify the key studies by number of citations within the field of ESG and VC research. The GCS and LCS scores are a good approximation to the measures of centrality in the network and help localize key papers in terms of degree centrality, which can be considered influential within a particular stream of literature (Knoke & Yang, 2008). Table 3 lists the 9 most cited papers in the field, ranked according to their GCS and LCS scores. By identifying the most highly cited papers within the field, this study provides a valuable resource for researchers looking to gain a deeper understanding of the key concepts that have shaped the landscape of ESG and VC research.

Table 3. Top 9 articles by Global and Local Citation Score (Part 1)

No.	Authors	Title	Year	Journal	GCS	LCS	ACS	CC
1	Waldron, A., Mooers, A. O., Miller, D. C., Nibbelink, N., Redding, D., Kuhn, T. S., Roberts, J. T., Gittleman, J.	Targeting global conservation funding to limit immediate biodiversity declines	2013	<i>Proceedings of the National Academy of Sciences (PNAS)</i>	336	97	31	No
2	Austin, J., Seitanidi, M. M.	Collaborative value creation: A review of partnering between nonprofits and businesses. Part 2: Partnership processes and outcomes	2012	<i>Nonprofit and Voluntary Sector Quarterly (NVSQ)</i>	249	75	21	No
3	Zhang, L., Sun, X., Xue, H.	Identifying critical risks in Sponge City PPP projects using DEMATEL method: A case study of China	2019	<i>Journal of Cleaner Production</i>	88	61	18	No
4	Etzkowitz, H., Zhou, C.	The Triple Helix: University-industry-government innovation and entrepreneurship	2017	Publisher: Routledge	123	85	18	No
5	Bocken, N. M. P.	Sustainable venture capital — Catalyst for sustainable start-up success?	2015	<i>Journal of Cleaner Production</i>	148	60	16	Yes

Table 3. Top 9 articles by Global and Local Citation Score (Part 2)

No.	Authors	Title	Year	Journal	GCS	LCS	ACS	CC
6	Mondal, M. A. H., Bryan, E., Ringler, C., Mekonnen, D., Rosegrant, M.	Ethiopian energy status and demand scenarios: Prospects to improve energy efficiency and mitigate GHG emissions	2018	<i>Energy</i>	77	55	13	No
7	Battisti, E., Nirino, N., Leonidou, E., Thrassou, A.	Corporate venture capital and CSR performance: An extended resource-based view's perspective	2022	<i>Journal of Business Research</i>	24	22	12	Yes
8	Scholtens, B.	Finance as a driver of corporate social responsibility	2006	<i>Journal of Business Ethics</i>	200	62	11	Yes
9	Criscuolo, C., Menon, C.	Environmental policies and risk finance in the green sector: Cross-country evidence	2015	<i>Energy Policy</i>	94	48	10	Yes

Note: GCS represents the Global Citation Score, LCS represents the Local Citation Score, ACS represents the Average Citation Score per year, and CC represents the Creative Commons.

We can notice that some of the identified works are included in the connected component of the main path presented later. This means that there are no breakthrough studies excluded from the previous analysis.

The comparison between the GCS and the CNA allows us to identify seminal works that may not be included in the citation network but have a significant number of citations in the entire Scopus database. Table 3 shows the importance of the papers included in the main path, indicating that they are not only relevant within the citation network but also have a broader impact within their field. However, this analysis also identified additional papers that were not included in the main path but were highly cited, demonstrating the effectiveness of the CNA in detecting other relevant works. These papers corroborate the relevance of ESG in the financial sector as a trending topic, confirming themes already discussed before, such as the importance of ESG for the development of VC-backed startups (Bocken, 2015), but also pointing out the existence of other issues, regarding policy regulation. For example, Criscuolo and Menon (2015) find that environmental policies have a positive and significant impact on the likelihood of firms obtaining external financing for green innovation. The authors also find that the impact of environmental policies is stronger in countries with more developed financial systems and greater environmental awareness.

The objective of CNA is to uncover hidden patterns of author relationships based on their publications. This analysis is based on a citation network, which represents a network where the nodes are the authors, and the links are citations. Figure 5 shows the citation network related to this work, which is composed of several isolated nodes and connected components. A connected component is a set of nodes connected by links (in this case citations), and the analysis can only be applied to

connected components. On this basis, in this work, we identified 91 connected authors, which the VOS-algorithm divides into seven clusters.

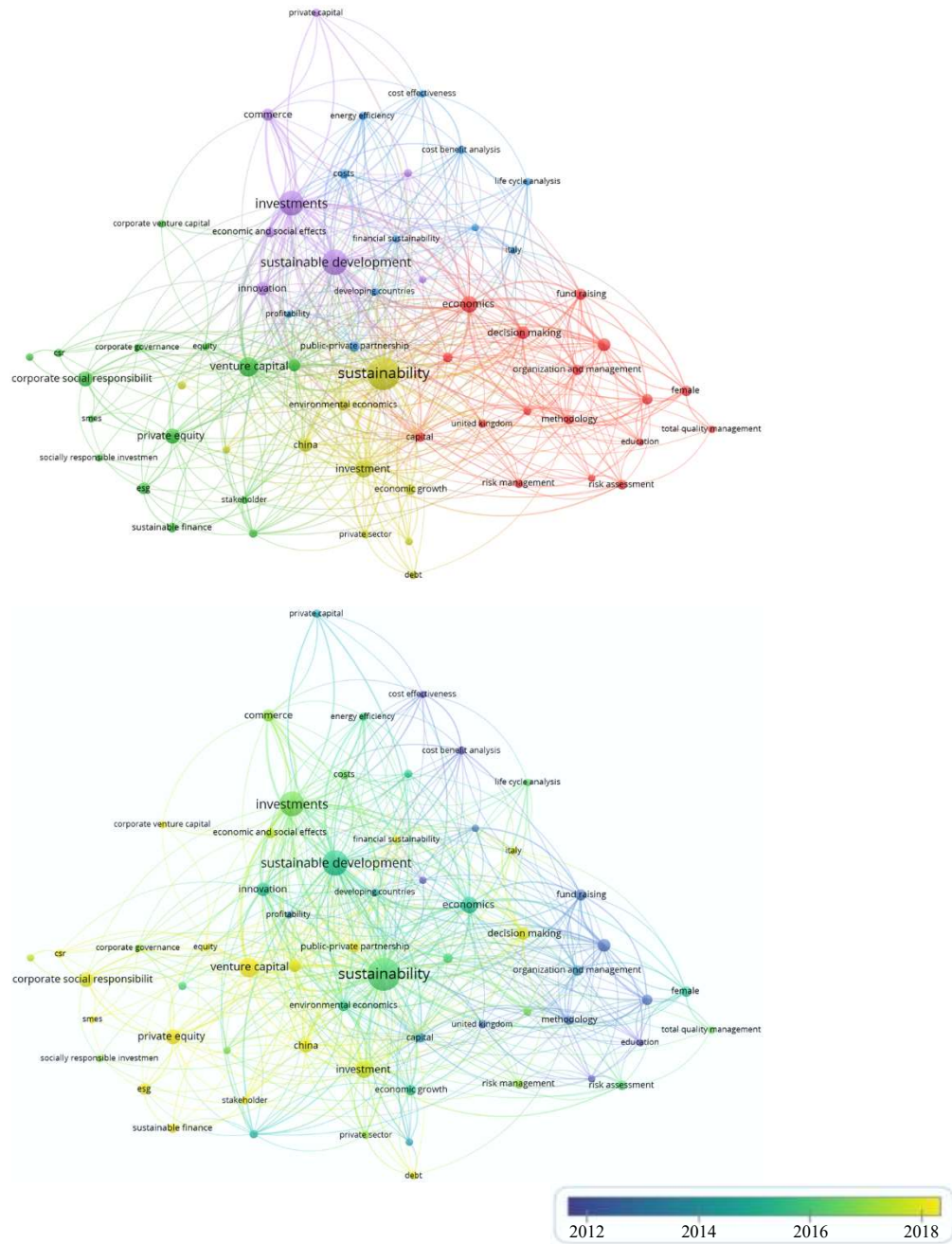
4.2.2. Co-occurrence network of author keyword with cluster partition

In this section, we focus on answering RQ4 through a co-occurrence analysis, which maps all the keywords based on their occurrence in our sample. Using VOSviewer, this analysis creates a visual map of the various keywords and topics that are of interest to researchers in the field of ESG and VC. By mapping the occurrence of these keywords, this analysis facilitates a deeper understanding of the foundational themes, topics and issues that are driving research in this domain. To build the co-occurrence network, after extracting the keywords of the 357 papers, we set a threshold value of six for the overall appearance of keywords that ensures a reasonable number of nodes. The co-occurrence of words in papers is examined to assess their relatedness (Migliavacca, 2022). The resulting network was then analysed by implementing the clustering technique (Van Eck & Waltman, 2010). Scholars have investigated the relationship between VC and ESG from different perspectives and taken into consideration the evolution of terms in these fields closely related. The following relevant lines of development can be outlined starting from the results of the keywords-based bibliometric analysis returned by VOSviewer.

Figure 4 represents four distinct clusters (communities) of authors' keywords. These clusters are analysed by identifying the similarities among the topics within each cluster and selecting the most relevant works related to each cluster.

For the analysis, we considered for each cluster the most relevant terms based on average citation and total link strength.

Figure 4. Co-occurrence analysis



Source: Authors' elaboration.

Keyword cluster 1: Decision-making process in portfolio and risk management (mostly in the United States and the United Kingdom)

This cluster studies the development of a theoretical framework that focuses on the institutional and regulatory factors that are driving the integration of ESG considerations in VC. Institutional investors such as pension funds and endowments are increasingly demanding that investment managers consider ESG factors in their investment decisions. Additionally, there is growing regulatory pressure on companies to disclose their ESG performance and for investors to consider these factors in their investment decisions. These factors may incentivize VC firms to consider ESG factors in their investment

decisions and may lead to increased standardization and transparency in the industry. In line with what this cluster describes, it represents in terms of time, the oldest one because it examines the conceptual framework useful for laying the foundation for the application of the concepts considered.

Keyword cluster 2: Stakeholder theory in private capital (mostly in China)

This cluster, which represents the youngest in terms of time, shifts the focus from the theoretical framework to the application of the concepts, discussed in the previous cluster. This cluster emphasizes the close connection between these themes. In particular, the focus emerges on impact

investing: private equity (PE) and VC firms may engage in impact investing, which seeks to generate both financial returns and measurable social or environmental impact. Impact investing can align with corporate social responsibility (CSR) goals and stakeholder theory by considering the interests of all stakeholders, not just investors. More specifically, in this cluster emerges that PE, VC, and corporate venture capital (CVC) firms may consider ESG factors when making investment decisions. This can align with CSR goals by considering the social and environmental impacts of companies' operations and can also align with stakeholder theory by considering the interests of all stakeholders. Another key point is strategic partnerships: CVC can provide established companies with a potential source of strategic partnerships or acquisitions that can help them achieve their CSR goals or align with stakeholder theory. Considering CSR goals and stakeholder interests can help PE, VC, and CVC firms generate long-term value by building stronger relationships with stakeholders and improving the sustainability and resilience of their portfolio companies.

Keyword cluster 3: ESG value creation strategies in venture capital

The third main strand of research emerging from the bibliometric analysis investigates the validation of the model. The keywords that emerge from this cluster are "energy efficiency", "cost-benefit analysis", "profitability" and "international cooperation", which are strictly connected to ESG, that can help businesses and countries achieve their environmental and financial goals. By prioritizing energy efficiency and considering its financial and environmental benefits, decision-makers can improve their bottom line while reducing their environmental impact, according to the regulations established in recent years. More specifically, there is a growing body of research that suggests that companies with strong ESG practices tend to be more energy efficient. For example, a study by the *Harvard Business Review* found that companies that performed well on ESG metrics tended to have better energy efficiency than their peers. This relationship may be driven by factors such as better management practices, greater investment in renewable energy, and a focus on reducing waste and emissions. Moreover, it is important to also analyse the cost-benefit analysis and incorporate ESG factors into it. Some studies suggest that considering ESG factors can help to ensure that investments provide a net profit to society. This means that companies with strong ESG practices tend to outperform their peers in terms of stock performance and profitability. This is also determined by strong international cooperation. In fact, the *Paris Agreement* by the United Nations (UN) Climate Change Conference (COP21), includes provisions for countries to report on their emissions reduction efforts and to work together to address the impacts of climate change. More specifically,

international organizations such as the UN, are also increasingly focused on promoting sustainable development and addressing global environmental and social challenges. VC can play a role in promoting energy-efficient projects and international cooperation, which investments can help accelerate the adoption of energy-efficient technologies by financing projects that have a positive impact on society and the environment.

Keyword cluster 4: ESG effects on the economic environment (mostly Europe)

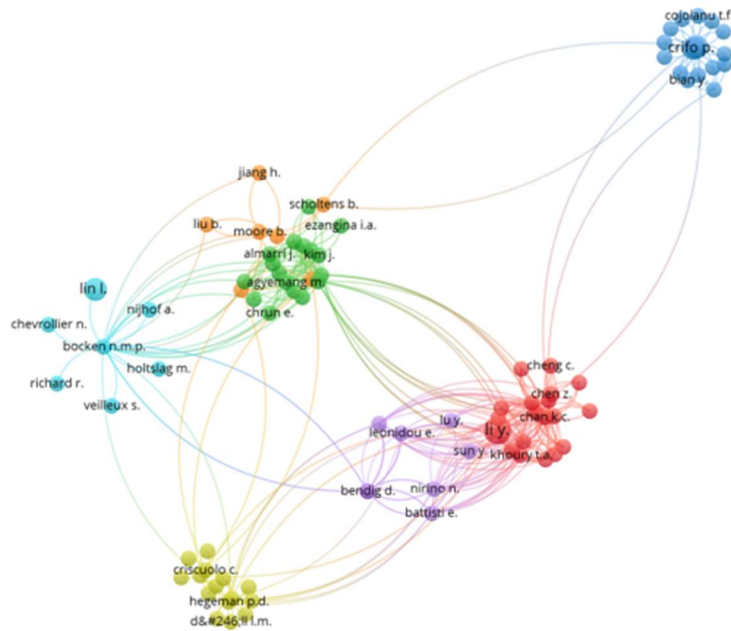
This last cluster, which in temporal terms represents the second youngest, is closely related to the concepts in cluster 3. Indeed, this type of investment can help promote sustainable development and address global challenges collaboratively. While globally there was a more precise regulatory policy on this front, Europe has set ambitious targets for sustainable development and environmental sustainability, such as the European Green Deal, which aims to make the EU carbon-neutral by 2050. Achieving these targets will require significant innovation across a range of sectors, including energy, transport, and agriculture. From studies emerges that in Europe, there is a growing ecosystem of VC firms and impact investors focused on supporting sustainable and socially responsible investments. These have a relevant effect on economic and social aspects to stimulate economic and innovation growth and enhance social well-being, accompanied by appropriate policy measures and regulatory frameworks.

4.2.3. Co-authorship network with cluster partition

Focusing on the co-authorship network helps us in answering RQ5 by assessing the main collaboration patterns in the network.

According to Figure 5 below, the articles of Moore and Wüstenhagen (2004) and Scholtens (2006) are the main articles in the authors' cluster 7. These articles set the stage for the downstream academic discussion. The key topic in these articles is the introduction of CSR and sustainability in the financial sector, addressing the possible interconnection between financing and CSR innovation at the company level. Specifically, the research of Moore and Wüstenhagen (2004) is based on a multi-year project conducted in Switzerland and highlights the role of VC in inducing sustainable innovation in the utilities sector. Following these articles, we highlight three different pathways which compose different streams of research and perfectly encapsulate most of the key topics covered in the intersection of the two research fields. Starting with the first pathway, composed of the main article by Wöhler and Haase, (2022), we see that the article of the cluster is mostly related to the investment decision process between traditional VC investors and sustainable startups.

Figure 5. Co-occurrence analysis



Source: Authors' elaboration.

The authors' cluster 6 led by the field-defining paper of Bocken (2015), is focused on investigating "how venture capitalists can contribute to sustainable business success, by investigating their role, motivations, investment theses, and barriers and enablers to success of sustainable ventures" (p. 647). The other research of cluster 6 focuses on addressing the effects of ESG on the VC sector (Lin, 2021) and how venture capitalists can steer startups and innovation toward sustainable goals (Holtzlag et al., 2021; Richard & Veilleux, 2018). Thus, this cluster's papers have been crucial in developing a draft framework to connect ESG and VC literature.

Another authors' networked cluster 5 is headed by Battisti et al. (2022). This article is based on longitudinal data and focuses on analysing the effects of VC investments on CSR and stakeholder orientation, linking the findings to previous research within different theoretical frameworks, such as the resource-based view (RBV). As a matter of fact, this most recent cluster of the network shows how the academic debate moved from pure ESG and sustainability concerns back to CSR. The causes of this shift may be attributed to the need to reframe the discussion and ground it to a common theoretical framework already supported by strong evidence.

Within the authors' cluster 4, the research by Criscuolo and Menon (2015) aggregates data from 29 countries over the period 2005–2010, identifying the role that policies (both supply-side policies, and environmental deployment policies) might play on the VC sector investments. According to Figure 5, another important paper that emerged in this cluster is by Hegeman and Sørheim, (2021), which explores how VC invests in cleantech startups and why they do it.

On the other hand, the two most relevant papers in the authors' cluster 3 (Crifo & Forget, 2013; Crifo et al., 2015), are related to the assessment of the effects of an ESG approach to investing, specifically in private equity investors. We also note that the first attempts to measure the effects of

an ESG approach are all based on self-reported questionnaires and experiments on groups of private equity investors, hence being subject to possible self-report bias and sampling bias.

Within the authors' cluster 2 led by the insightful papers (Ed-Dafali & Bouzahir, 2022; Antarciuc et al., 2018), explored the enablers for sustainable VC investments investigating their causal and effect interconnections. In detail, the purpose of the studies was to examine the dynamic behaviour of venture capitalists and the mediating role of trust in the entrepreneur/VC relationship.

Finally, the most recent authors' cluster 1 is led by the papers of Li et al. (2021) and Alakent et al. (2020). These two articles found some evidence of the relationship between corporate governance and CSR interconnections in companies invested by VC. In detail, the papers study how CSR is guided by ownership history, specifically whether a company receives VC funding or not, demonstrating that VCs improve the effort on CSR activities when the VCs are reputable.

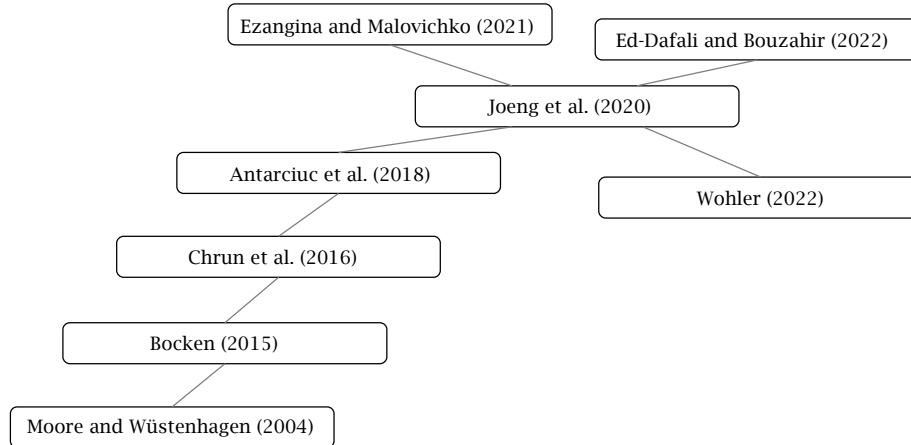
4.2.4. Main path

The main path articles investigated to answer RQ6 help us assess the most relevant chain of connected papers in the network, showing its core development over time (see Figure 6). The earliest study on the main path of ESG and VC investment is by Moore and Wüstenhagen (2004). The authors analyze data from a survey of 36 energy VC firms to determine the amount of money invested, the stage of development of the companies receiving funding and the types of energy technologies that are attracting investments. The results show that energy VC firms invested a total of \$1.3 billion in 2003, with an average investment of \$12.6 million per firm. Most of the investments were made in early-stage companies, with only 10% going to later-stage firms. The authors also found that investments were concentrated in three primary areas: 1) energy

efficiency and conservation, 2) renewable energy, and 3) clean technologies. From an ESG perspective, the energy sector is particularly important, as it is a major contributor to greenhouse gas emissions and other environmental and social impacts. Therefore, VC investments in energy technologies and companies are likely to be closely scrutinized

from an ESG perspective. Overall, while the paper of Moore and Wüstenhagen (2004) does not directly address ESG issues, it highlights the potential for VC investments to drive innovation and growth in the energy sector and the importance of considering sustainability factors in these investments.

Figure 6. Main path



Source: Authors' elaboration.

Then, the results of Bocken (2015), address the research on the role of sustainable venture capitalists in contributing to the success of sustainable startups. The paper provides a theoretical framework for understanding the unique challenges faced by sustainable startups and suggests ways in which sustainable VCs can help to address these challenges. They include the need to navigate complex regulatory environments, build sustainable supply chains, and the need to communicate the social and environmental benefits of their products or services to consumers and investors. To address these challenges, the paper suggests that sustainable VCs can play a number of important roles, including: 1) strategic guidance, helping sustainable startups to navigate complex regulatory environments and develop sustainable supply chains; 2) networking opportunities to connect sustainable startups with potential partners, suppliers, and customers, and help them to build relationships within the sustainability community; 3) marketing and branding support, helping sustainable startups to communicate their sustainability benefits to consumers and investors, and to build strong brands that resonate with sustainability-minded audiences; 4) financial support, to provide the financial resources necessary for sustainable startups to scale their operations and reach new markets and help them to improve economic and financial performance.

Chrun et al. (2016) prove that efforts of companies to reduce their environmental impact and adopt more sustainable business practices through the concept of corporate environmentalism, to pursue environmental sustainability. The authors identify several different motivations for corporate environmentalism, including reputation management, regulatory compliance, cost savings, and ethical concerns, which can be categorized into two main types of corporate environmentalism: strategic environmentalism and principled environmentalism. *Strategic environmentalism* refers to the use of

environmental sustainability as a means to achieve other strategic goals, such as cost savings or reputation enhancement. This approach is often driven by market pressures or regulatory requirements and may not be motivated by a strong commitment to environmental sustainability. *Principled environmentalism*, on the other hand, refers to a genuine commitment to environmental sustainability as a core value of the company. This approach is often driven by ethical concerns or a desire to contribute to the broader goal of global sustainability. Overall, the paper highlights the importance of taking a comprehensive and integrated approach to corporate environmentalism and emphasizes the need for principled environmentalism to achieve genuine sustainability goals.

Following this research stream, Antarciuc et al. (2018), investigate empirically the causal and effect interconnections between these enablers in the context of sustainable VC investments, with a focus on the growth of sustainable startups. More precisely, the paper provides a theoretical framework for understanding the unique challenges and opportunities of sustainable VC investments. The authors, indeed, argue that sustainable VC investments require a comprehensive and integrated approach that takes into account the social, environmental, and financial dimensions of sustainability. In fact, the study identifies several critical enablers of sustainable VC investments, including: 1) access to financial resources; 2) entrepreneurial and managerial competencies; 3) supportive regulatory and policy environment to incentivize sustainable investment; 4) social and environmental impact assessment, measuring the impact on financial performance. Overall, the paper's empirical investigation provides valuable insights into the factors that contribute to the success of sustainable startups and sustainable investment more broadly.

Then, Jeong et al. (2020) examine the relationship between VC investment at different stages of growth and a startup's sustainable growth and performance. The paper focuses on the impact of VC investment on environmental and social sustainability, as well as financial performance. The study finds that VC investment has a positive impact on a startup's sustainable growth and performance, but that the impact varies depending on the stage of growth at which the investment is made. Specifically, the study finds that:

- Early-stage VC investment has a positive impact on environmental and social sustainability, but not on financial performance.
- Late-stage VC investment has a positive impact on financial performance, but not on environmental or social sustainability.
- Intermediate-stage VC investment has a positive impact on both financial and environmental sustainability, but not on social sustainability.

The paper also explores the mechanisms through which VC investment impacts sustainable growth and performance, including access to financial resources, strategic guidance and social and environmental pressure.

In recent times we have witnessed a catastrophic event due to the pandemic, which has certainly impacted the behavior of VC investors in an uncertain situation. Ezangina and Malovichko (2021), examine how the COVID-19 pandemic has affected the institutional behavior of VC investors and the sustainability of their investments. The paper begins by providing a theoretical framework for understanding the impact of the pandemic on VC investment behavior and sustainability. From results emerge that the pandemic has created a high level of uncertainty in the market, leading to changes in the behavior of VC investors and their portfolio companies. They also note that the pandemic has

accelerated the pace of innovation, creating new opportunities and challenges for sustainable investing, with many startups pivoting to new business models and technologies in response to the crisis.

Another mainstream of research consists of analysing how sustainability affects the decision-making of traditional venture capitalists and what are the emotional drivers that impact on decision-making process. Based on the literature, the study by Wöhler and Haase (2022) is noteworthy empirical research on the topic of sustainable entrepreneurship and VC decision-making. The study examines how VC investors make decisions when investing in sustainable and non-sustainable ventures, considering the emotions and perceptions underlying their decision-making process. This study is a rare example of empirical research on this topic, providing valuable insights into the role of emotions and perceptions in VC decision-making related to sustainability. One of the perceptions that play a key role in the decision-making process is the trust that is established between entrepreneurs and VC investors. In fact, Ed-Dafali and Bouzahir (2022), explore the dynamic behavior of venture capitalists and the mediating role of trust in the entrepreneur/VC relationship. The authors may investigate how trust plays a role in the decision-making process of VCs, how it influences their investment decisions, and how it can impact the long-term success of this relationship. The study may also highlight the importance of trust in fostering long-term relationships between entrepreneurs and VCs, as well as in building successful and sustainable ventures. The findings may provide insights into how entrepreneurs can establish and maintain trust with VCs, how VCs can assess and manage trust in their relationships with entrepreneurs, and how this can ultimately benefit both parties.

Table 4. Articles included in the connected components' main path of the citation network

<i>Authors</i>	<i>Year</i>	<i>Research question</i>	<i>Methodology</i>
Moore, B., Wüstenhagen, R.	2004	How much do energy VC companies invest? Recent experience with energy VC investments.	Theoretical framework
Bocken, N. M. P.	2015	How can sustainable venture capitalists contribute to the success of sustainable startups?	Interviews
Chrun, E., Dolšak, N., Prakash, A.	2016	Examines firms' motivations to invest in corporate environmentalism, focusing on a specific class of investors, green venture capitalists, who believe in the transformative potential of pairing green innovation with VC and the consequences of CE for their environmental and economic performance.	Theoretical framework
Antarciu, E., Zhu, Q., Almarri, J., Zhao, S., Feng, Y., Agyemang, M.	2018	Investing in sustainable projects can help tackle the current sustainability challenges. VC investments can contribute significantly to the growth of sustainable startups. This study pinpoints the most critical enablers and investigates their causal and effect interconnections.	Structural equation modeling
Jeong, J., Kim, J., Son, H., Nam, D.-I.	2020	How does VC investment at each stage of growth aspects a startup's sustainable growth and performance?	Regression with moderator
Ezangina, I. A., Malovichko, A. E.	2021	Analyzes the impact of the pandemic on the sustainability of institutional behavior of VC investment under conditions of uncertainty and accelerating innovative development.	Systemic-structural approach
Wöhler, J., Haase, E.	2022	Analysis of the understanding of VC investment decision-making in the context of sustainable entrepreneurship.	Case study
Ed-Dafali, S., Bouzahir, B.	2022	Examines the dynamic behavior of venture capitalists and the mediating role of trust in the entrepreneur/VC relationship	Structural equation modeling (PLS-SEM)

4.2.5. Emerging themes: Kleinberg's burst detection algorithm

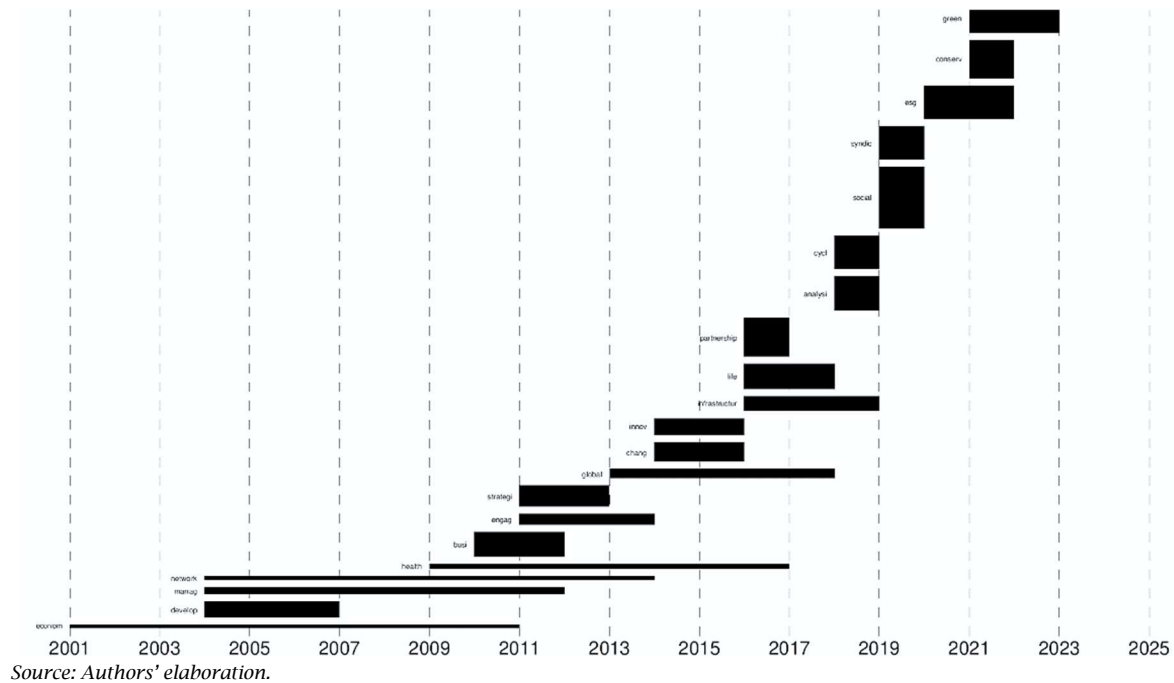
In this section, we focus on answering RQ7 by adopting the "bursts" mapping approach proposed by Kleinberg (2003). "Bursts" refer to a series of

topics that emerge successively over a particular period, with each one gaining increased attention and interest from the research community within a short timeframe. Kleinberg's approach allows us to identify and map these bursts of topics over time, providing insights into the evolution of research

interests and priorities within the field of study. This model can be seen as a sequence of topics that appear, grow in importance and intensity for a specific period and then disappear. The pre-processing of author keywords involves the use of Sci2Tool to remove stop words, upper cases, and

other irrelevant text elements through a text analysis algorithm. The results of Kleinberg's burst detection algorithm are shown in Figure 7, describing the process in a horizontal bar graph visualization (in Appendix A we report the full list of stemmed terms).

Figure 7. Burst detection algorithm applied to normalized author keywords



On the X-axis, time is represented, while the horizontal bars represent normalized words. The weight of each bar indicates the intensity of the “burst”, or the extent of the frequency change of the word that triggered it. The length of each bar corresponds to the time intervals in which these “bursts” occurred, and the thickness of each bar is proportional to the “burst” weight. In this section, we develop a temporal analysis, in which three periods were identified. According to the first burst, at the starting point from 2001 to 2011, we see a considerable number of bursts including: “econom*”, “develop”, “manag*”, “network”, “health”, “business”, “engagement”, and “strategi*”. These studies related to this burst aim to focus on the company level of value creation, concerning the structure of management and governance corporations. These years have also been a time of rapid globalization, with companies expanding their operations across borders and new technologies enabling greater connectivity and collaboration. This may have led to greater interest in issues related to networking, engagement, and strategy.

In the second period, starting from 2013 to 2018, most of the research interest is instead centred around economy-wide aspects and systematic effects, developing the first theoretical models. Indeed, the considerable number of bursts that emerge are essentially: “global”, “chang*”, “innov*”, “infrastructur*”, “partnership”, “life”, “cycl*”,

From 2019 to the present, we have seen considerable growth and long-term focus on considerable terms such as: “venture”, “capital”,

“green”, “ESG”, “syndic*”, “conserve*” and “social”, which highlight the importance of sustainability and its financial impact for companies and businesses.

In addition, we are seeing a growing focus on the impact of regulatory policies on ESG that is increasingly capturing the attention of practitioners. Overall, excluding the search terms like VC, ESG, and sustainability, the most impactful keywords that emerged by weight analysis are specifically: “busi*” included in the first period, together with “develop*”, “global*” in the second period and at the end “social” in the third period.

5. CONCLUSION

In our analysis, we added to extant bibliometric literature reviews on VC (Cumming et al., 2023) and ESG (Mishra & Kumar, 2023) by framing the state of the art of research merging the two fields. In our findings, we highlighted the key authors and papers within the network of this research area and defined both the major keywords and authors' clusters of the network. Furthermore, the qualitative valuation of the papers highlighted by this network analysis engendered a synthesis of the key research themes. We reported the most important papers produced by the intertwining of the two research fields.

The evolution of this research strand underscores a substantial paradigm shift in investment strategies and their influence on sustainability. Beginning with Moore and Wüstenhagen (2004), which laid the foundation by exploring the landscape of energy VC investments, subsequent studies have continually probed the role and impact of ESG factors in the VC

ecosystem. Notably, Bocken (2015) highlighted the pivotal role of sustainable VCs in steering the success of sustainable startups. Whereas VC firms are increasingly considering ESG factors when making investment decisions and policies are being implemented to standardize and promote this adoption, our results suggest the need to further the academic debate by setting a theoretical framework of reference and assessing from a quantitative standpoint the market.

By exploring and synthesizing the relevant themes through keywords we find four major research streams that are: 1) decision-making process in portfolio and risk management; 2) Stakeholder theory in private capital; 3) ESG value creation strategies in VC; 4) ESG effects on the economic environment. These four thematic clusters highlight the impact of ESG both from the perspective of VC in the decision-making process and risk management approach and from the perspective of value creation for businesses. Additionally, these findings are supported by burst detection analysis which emphasizes the key role of ESG as an added value for companies and as a new pillar for investors in their investment decisions, in line with regulatory policies.

The analysis of papers by co-authorship frames seven authors' clusters, each one focusing on a specific topic within the broad VC research field and applying ESG considerations. All these clusters derive from cluster 7, led by Moore and Wüstenhagen (2004) and Scholtens (2006) introducing CSR considerations to the VC research field, and successive ramifications, which fragmented the results into separate frameworks.

From the considerations of this analysis, we show the need to integrate the new themes and practices into a comprehensive framework. As per the co-authorship clustering, the academic research started from a unique framework of CSR (a precursor of ESG) and eventually diverged adapting to different subthemes of the VC activity (i.e., the four thematic clusters). Our findings have implications for practitioners, entrepreneurs, and policymakers, as we synthesize the key literature, authors and main topics of the fragmented academic debate working specifically on this cross-disciplinary field. Additionally, we highlight how literature is structured to cope with the lack of an integrated theoretical framework and standardized metrics while exploring how ESG considerations influence investment decisions made by venture capitalists.

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Even though responsible and sustainable investing (SRI) and ESG investment considerations are increasing, the data and academic research on 1) how VC funds are integrating ESG investment criteria in their investment process, and 2) how ESG investments perform, are disjoint. This represents an emerging challenge, which requires the implementation of specific technical knowledge to measure ESG under a solid and comprehensive theoretical framework, but in the academic debate (as shown in the extant analysis) we witness a regression to a theoretical debate since 2021.

Despite the comprehensive exploration of scholarly articles within the Scopus database, it is important to acknowledge the limitation imposed by the exclusive reliance on this source. The field under investigation is nascent and the usage of Scopus, while valuable, may not encompass the entirety of relevant literature. Future research endeavors could benefit from a more extensive examination across different databases to ensure a more holistic understanding of the evolving landscape within the chosen field.

Despite these limitations, it is important to emphasize the potential value of our search methodology. Our approach may prove invaluable for academic scholars within both the VC and ESG fields, offering a resourceful avenue to identify key references authored by individuals from the opposite research field. This cross-disciplinary perspective can be particularly useful for academics seeking alternative insights from the opposite side of the spectrum.

For policymakers, our paper holds utility in delineating thematic clusters, thereby assisting in the identification of main topics where ESG considerations impact the VC field and vice versa. This nuanced understanding can contribute to informed decision-making by policymakers who aim to navigate the intersection of VC and ESG research strands.

In a broader context, literature reviews are crucial tools for emerging scholars entering this dynamic and evolving field of research. Our work provides these young scholars with valuable resources and methodologies to effectively map the body of literature, enabling them to identify key papers and gain a comprehensive understanding of the landscape. In this way, our research serves as a guiding compass for those navigating this nascent field of study.

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APPENDIX A. TERMS OF THE KLEINBERG'S BURST DETECTION ANALYSIS

The following table reports the comprehensive list of stemmed terms detected by Kleinberg's burst detection algorithm.

Table A.1. List of stemmed terms from the Kleinberg's burst detection algorithm

<i>Keyword</i>	<i>Start</i>	<i>End</i>	<i>Duration</i>	<i>Main article by citation</i>
<i>Analysi</i>	2018	2018	0	Fregonara et al. (2018)
<i>Conserv</i>	2021	2021	0	Cumming et al. (2021)
<i>Enqaaq</i>	2011	2014	3	Crifo et al. (2013)
<i>Partnership</i>	2016	2017	1	Antonini et al. (2016)
<i>Esg</i>	2020	2023	3	Zaccone et al. (2020)
<i>Busi</i>	2010	2012	2	Austin et al. (2012)
<i>Strategi</i>	2011	2013	2	De V. Smit (2005)
<i>Innov</i>	2014	2016	2	Etzkowitz et al. (2006)
<i>Develop</i>	2004	2007	3	Callaway et al. (2007)
<i>Green</i>	2021	2023	2	Criscuolo and Menon (2015)
<i>Chang</i>	2014	2016	2	Bowe et al. (2015)
<i>Cycl</i>	2018	2018	0	Lee et al. (2018)
<i>Syndic</i>	2019	2019	0	Liu et al. (2019)
<i>Infrastructur</i>	2016	2019	3	Patil et al. (2016)
<i>Ventur</i>	2022	2023	1	Battisti et al. (2022)
<i>Manag</i>	2004	2012	8	Rudd (2004)
<i>Health</i>	2009	2017	8	Coghlan (2015)
<i>Capit</i>	2022	2023	1	Battisti et al. (2022)
<i>Social</i>	2019	2020	1	Vanderhoven et al. (2020)
<i>Global</i>	2013	2018	5	Waldron et al. (2013)
<i>Life</i>	2016	2018	2	Lee et al. (2018)
<i>Econom</i>	2001	2011	10	Sheppard et al. (2011)
<i>Network</i>	2004	2014	10	van Geenhuizen et al. (2012)

Source: Authors' elaboration using Sci2Tool data.