DOI: 10.28934/ea.23.56.2.pp68-83 First Online: December 12, 2023

REVIEW PAPER

Systematic Literature Review of Sustainable Finance: Implications for Entrepreneurial Finance through Venture Capitals (VC)

Rosa Mehrabi[1]*

[1] Université Libre de Bruxelles, Solvay Brussels School of Economic & Management, Brussels, Belgium

ABSTRACT

The idea of sustainable development as a whole gave rise to the concept of sustainable finance in recent decades. It illustrates how financial markets address the current and upcoming economic, social, and environmental issues. This study reviews the literature on sustainable finance and how it relates to venture capital and entrepreneurial finance research topics. As part of the research process, a Systematic and methodical assessment and analysis of the literature was carried out. The results present comprehensive summaries of the main themes and frameworks, as well as the opportunities, challenges, strengths, and weaknesses of the fields. It also highlights the interaction between sustainable finance and venture capital in supporting innovation and sustainability in entrepreneurship. The main paper's contribution is to identify sustainable finance as a process that operates at multiple levels. It indicates that a shift in the financial paradigm from profit maximization to sustainability facilitation is required to attain sustainable development at the level of private financial markets and sustainable entrepreneurship. According to the findings, venture capital funds are major participants in the private financial sector, supporting entrepreneurial startups and playing a key role in sustainable finance by promoting a culture of innovation, resource efficiency, and sustainability among entrepreneurial ventures. The paper cites critical review as the source of these arguments. Finally, through applying this comprehensive critical analysis, several gaps in the existing literature have been identified and discussed.

Keywords: *sustainable finance, ESG, entrepreneurial finance, sustainable entrepreneurship, startup, venture capital*

JEL Classification: Q01, L26, M13, G24

INTRODUCTION

Most disciplines of the social sciences require an understanding of sustainable development principles as one of the most important theoretical frameworks in environmental economics (Todorović, 2018). It has always been the most challenging issue for economists, as well as for national and local governments around the world, to address social and financial exclusion, growing income inequalities, an ineffective wealth distribution scheme, and adverse economic externalities (Ziolo et al., 2019). A key role played by the financial sector in applying Sustainable Development Goals (SDGs) can be stated when assessing its contribution to the economy (Dhayal et al., 2023; Ziolo, Bak, & Cheba, 2021). Despite the financial sector's traditional model, which is

* E-mail: rosa.mehrabi@solvaypostgrad.net

predicated on maximizing profits, the global economy is currently shifting toward a circular and low-carbon economy. In this sense, financial markets are adjusting to the emerging trend of green economy and sustainable finance and investment (Ryszawska, 2018; Li, Zhang & Solangi, 2023). It means converting the existing economy to one that mainly focuses on Environmental, Social, and Governmental (ESG) responsibilities (Robertson, 2020).

The United Nations Environmental Program introduced the concept of "Sustainable Finance" following the first Earth Summit in Rio in 1992 (Strandberg, 2005). Low emissions, resource efficiency, clean technologies, responsible consumption, social justice, and equality between and within generations were at the heart of sustainable finance conceptualization (Schütze & Stede, 2021). At that point, sustainable finance examines the relationship between finance and social, economic, and environmental challenges and helps determine how best to balance sustainable objectives in a strategic manner. In order to provide steady financing of the actual economy and efficient resource allocation, it helps to defeat environmental concerns and successfully manage financial markets (Ryszawska, 2018).

Going forward, a number of organizations focusing on sustainable finance have emerged: The OECD Centre for Green Finance, Investments, Green Finance, the International Finance Corporation, Green Finance Study Group G20, Green Finance Initiative (GFI), and High-level Expert Groups on Sustainable Finance. The European Union (EU) also has had several related major endeavors over the past years (Migliorelli, 2021). In the context of the EU's policy, Sustainable finance refers to the application of financial capital to promote economic growth in a way that reduces environmental impacts and helps achieve the European Green Deal's climate and environmental goals while also considering social and governance issues. It also involves being transparent about the risks related to ESG factors that may affect the financial system and managing those risks through appropriate governance of financial and corporate actors. In fact, sustainability is considered the blueprint for Europe's forthcoming growth, and financing is a crucial tool for realizing aspirational objectives like social inclusion, economic prosperity, and environmental rejuvenation (Schütze & Stede, 2021).

In order to improve sustainability and inclusiveness in all facets of the environment and the workforce, the aforementioned institutions have highlighted the necessity for financial organizations to incorporate ESG features into the decision-making process of economic entities on both a micro and macro scale. Presently, the characterization of sustainable finance is the application of financing principles to initiatives and activities that focus capital flows on sustainable economic development to address worldwide issues, including human rights, social discrimination, and climate change (Guang-Wen et al., 2023). However, according to Migliorelli (2021), moving forward and thanks to practical and conceptual endeavors, the suggested explanation of sustainable finance is no longer just based on applying traditional principles of finance in mentioned areas. Instead, it has started acknowledging the contribution of finance to promoting sustainability. As some evidence, this contribution has been achieved by an introduction and application of financial instruments such as green and social bonds, as well as Impact investing practices (Zhang & Zhou, 2023).

According to Schoenmaker (2016) and Mendez & Houghton (2020), the major players in promoting sustainability in the financial sectors include parties such as governments and policymakers, banks, as well as private investment funds. Among them, in particular in private capital markets, private equity (PE) and venture capital (VC) funds have performed a considerable role in supporting contemporary economies' resilience and sustainable development (Breuer & Pinkwart, 2018). In addition, there have been debates around the importance of entrepreneurship in fostering sustainable practices, and as mentioned by Balaban, Župljanin & Ivanović (2016), entrepreneurship is at the core of the country's sustainable development and in the entrepreneurial finance process, venture capital is one of the pivotal vehicles. In this paper, venture capital is emphasized as a key ingredient in fostering sustainable finance by supporting innovative and entrepreneurial activities. Two factors contribute to this emphasis.

The first is the significance of the relationship between entrepreneurship, innovation, and sustainability. There is also the role that innovative companies play in promoting sustainable practices, as well as driving the development of sustainable-friendly technologies and products, and Mansouri & Momtaz (2022) refer to these endeavors as Sustainable Entrepreneurship (SE). This notion implies profit-oriented entrepreneurial attempts that prioritize broader objectives related to the ESG domains. Entrepreneurial ESG startups such as Novisto[1], Xpansiv[2], Cloverly[3], Spiral[4], or Ecolytic[5], can leverage sustainable business models to create competitive advantages and assist in the shift to a more environmentally friendly economy especially in the current fast-forward dynamic world with its urge to maintain sustainability (Di Vaio et al., 2022). ESG startups' agility, creativity, and willingness to take risks enable them to explore new pathways for sustainable development and drive an environmentally conscious and socially responsible economy (Johnson & Schaltegger, 2020).

The second consideration is the role played at private financial markets by venture capital funds in flourishing ESG startups. Venture capital contributes to the development of such startups by providing them with financial resources, expertise, and networking opportunities, enabling them to scale their operations, expand their impact, and drive positive change in various industries (Bocken, 2015). Since the COVID era, venture capital firms, which are the main source of entrepreneurial finance, have increasingly incorporated sustainability considerations into their investment decisions and portfolio management. In addition to the financial gains, they have shown how sustainable business prospects have the capacity to spur innovation and have accomplished social and environmental influences (Dhayal et al., 2023).

Overall, this paper explores the concept and principle of sustainable finance, which has various definitions and frameworks. It also examines the significant effects of using financial instruments such as venture capital funds to promote sustainable development. The paper focuses on the literature review of sustainable finance, especially on entrepreneurial finance and VCs, and provides a comprehensive and critical analysis of the topic.

THEORETICAL BACKGROUND

The Importance of Sustainable Finance

As described by Daly & Farley (2011), mainstream economic models were created during a time when the world was plentiful in goods and services provided by nature, dating back to the 19th-century Industrial Revolution. Economic production optimization at the time concentrated on limited resources like labor and capital, whereas nature and its resources were widely accessible. On the other hand, the global ecosystem, society, and economy all saw substantial changes as a result of the Industrial Revolution. Moreover, the deforestation for fuel contributed to human society's increasing reliance on non-renewable resources, especially fossil fuels. The increase in energy consumption made it easier to obtain other raw resources, which led to an unprecedented increase in consumer goods production, fostering economic and population growth. The process of urbanization further diminished arable land, prompting continued financing of the projects of deforestation. Nevertheless, the Club of Rome was among the earliest to warn, back in the early 1970s, that even with cutting-edge technology and sound financial principles, Earth's systems

[1] A software platform that helps companies measure, manage, and report their ESG performance.
[2] A digital marketplace that enables the trading of ESG-inclusive commodities, such as carbon credits, renewable energy certificates, and water rights.
[3] An API that allows online businesses and consumers to offset their carbon emissions from e-commerce, travel, and other activities.
[4] A banking app that rewards users for donating to social and environmental causes and provides them with insights on their ESG impact.
[5] a smart waste management system that uses artificial intelligence and IoT to optimize waste collection and recycling.

would not be able to support these rates of economic and population growth long past the year 2100 (Robertson, 2020).

Amongst these debates, and particularly in the aftershock of the 2008 global financial crisis, numerous experts and scholars began expressing dissatisfaction with how financial agents and markets were addressing the sustainability crisis (Dziawgo, 2014). They argued that financial markets were failing to adequately confront the most urgent sustainability challenges of our era (Fullwiler, 2016). Thus, financial systems needed an inclusive and sustainable economy and had to be reconciled by the theory of finance. In addition to tangible economic actions like resource pricing adjustments, environmental restrictions, and the revision of harmful subsidies, establishing the concepts and practices of sustainable finance was of high non-tangible significance as well (Castilla-Rubio, Zadek & Robins, 2016).

In conjunction with facilitating the transition from conventional financial instruments, with their implications for the carbon economy, Robertson (2020) stresses the significance of sustainable finance for fostering the creation and use of long-lasting business models, investments, trade, and policies. Recognizing the vital role played by the financial sector in steering sustainable economic development through its intermediary functions, the integration of sustainable finance into these endeavors becomes of utmost importance. Additionally, sustainable finance is seen as the outlook of the financial sector, leveraging innovative financial mechanisms and supporting investments in innovative and entrepreneurial projects that yield positive and sustainable externalities.

Definition of Sustainable Finance

Over the past few decades, the idea of sustainable finance has changed as part of the larger debate around corporate sustainability (Whiteman, Walker & Perego, 2013). It has been the financial markets' approach to facing difficulties in sustainable development (Ziolo et al., 2021). Scholtens (2006) highlights the role of finance in promoting sustainability, particularly in the context of socially conscious investing. Furthermore, according to Schoenmaker (2016), sustainable finance is the ability of an economy to shift from using money to maximize profits as a goal to using money as a means.

The aforementioned transition states that new ideas about sustainable finance have been introduced into the public discourse by means of various terms like green finance, climate finance, carbon finance, finance for sustainability, etc. The traditional function of finance is being challenged by these emerging approaches to sustainable financing, which are mission-, purpose-, and value-oriented (Ryszawska, 2018). To gain more insight into the essence of the concept, the various definitions introduced by related institutes and scholars have been summed up in table 1.

Table 1. Various conceptualizations of sustainable finance

Origin	Concept	Definition
(Mareels, 2018)	Sustainable finance	In order to achieve sustainable growth and the shift to an economy that is carbon neutral, sustainable finance refers to the mobilization of financial resources to include environmental, social, and governance (ESG) considerations in investment or company choices and decisions.
(Pástor, Stambaugh & Taylor, 2021)	Sustainable investing	A method of investing where portfolio management and selection take environmental, social, and governance (ESG) considerations into account.
(Berrou, Dessertine & Migliorelli, 2019)	Green finance	Investments made by both public and commercial entities in clean technology, eco-innovation, organic agriculture, waste management, water management, sustainable transportation, recycling, and renewable energy.
(Stewart, Kingsbury & Rudyk, 2009)	Climate finance	Encouraging climate change mitigation and adaptation. It also entails providing funding for the transition to low-emission and climate-resilient development.
(Labatt & White, 2011; Guo, Su & Chiao, 2021)	Carbon finance	Utilizing financial tools to minimize the effects of climate change and cut greenhouse gas emissions. It entails the production, exchange, and funding of carbon credits, which stand for a unit of elimination or reduction of emissions. Initiatives like energy efficiency, renewable energy, and forest preservation can also benefit from carbon financing.
(Mazzucato & Penna, 2015)	Mission-oriented finance	Usage of public funds and institutions to support innovation and transformational change. It involves setting missions that address climate change, health, or inequality and mobilizing public and private resources to achieve them. It also implies a rethinking of the criteria and indicators for evaluating public investments and their impacts.
(Guez & Zaouati, 2017)	Positive finance	Rethink how money is distributed to foster technological and social innovations, create and construct environmentally friendly infrastructure, and fund the transition of energy resources.
(Migliorelli, 2021)	Finance for sustainability	Funding to support industries or initiatives that help achieve or improve at least one of the pertinent sustainability dimensions.

Source: Authors' Literature Review

RESEARCH METHODOLOGY

A detailed study of significant publications on the subjects has been carried out, adhering to the methodology used by De Carvalho Ferreira et al. (2016) and aiming to identify the main themes in the academic and professional literature relevant to the issue of sustainable finance. This work has also modified the approaches offered by Junior & Godinho Filho (2010) for a systematic review of the literature about the connection between finance, sustainability, and entrepreneurial finance in a manner similar to the approach they used.

Using this technique, the writer is able to determine the primary features of the research and, specifically, to categorize the articles that address the following subjects:

(A) The framework aims to concretize sustainable finance.

(B) The opportunities and attention points of sustainable finance for its main players and stakeholders, with an emphasis on entrepreneurial finance through venture capital funds.

(C) The specific strengths and weaknesses of venture capital in the arena of sustainable finance.

To improve the understanding of the primary ideas under discussion, a systematic review of English-language literature was done for this study. Selected articles have a major impact on the field of inquiry and provide verified intellectual knowledge. The Scopus database was used in the research to pinpoint important contributions pertaining to the previously stated subjects. The Scopus database, which includes articles from ABI/Inform, Thompson Reuters Web of Knowledge, EBSCO, and other comparable search engines, is well-known for its extensive coverage of published research (Pranckutė, 2021). Peer-reviewed journal publications, book chapters, conference papers, and research notes published in reputable databases in the field between 2000 and 2023 were the main focus of the study. Three straightforward queries of TS= (sustainability AND finance) TS= (sustainability AND Venture Capital), TS= (sustainability AND entrepreneurship), which search the mentioned keywords in both titles and abstracts of the publications, were executed on the platform, yielding a total of 453 identified publications.

After separating the articles that specifically addressed sustainable finance from the initial dataset, the focus shifted to delving deeper into these publications. The second step was to identify articles that not only touched upon sustainable finance but also emphasized the domain of venture capital and sustainable entrepreneurship. The subsequent stages involved a comprehensive examination of the selected research papers to uncover their main areas of emphasis concerning sustainable finance and investment within the realm of venture capital.

In the subsequent sections of the paper, the findings of this critical analysis of the literature are thoroughly delineated. The paper presents a comprehensive overview of the key themes and frameworks, as well as opportunities, challenges, strengths, weaknesses, and perspectives derived from the compound of these scholarly works, shedding light on the interplay between sustainable finance and venture capital. Furthermore, the study highlights the specific focal points and pertinent issues within the field of sustainable investment as they relate to the context of entrepreneurial startups.

RESULTS AND DISCUSSION

Frameworks of Sustainable Finance

Investigating the literature revealed that several prominent scholars attempted to introduce landscapes or frameworks to illustrate the main characteristics and functions of sustainable financing and to make it more applicable in the real world. These frameworks are aimed at integrating sustainability building blocks into financing and investment decision-making. These frameworks are designed to promote responsible investing and encourage long-term value creation. The most cited sustainable finance frameworks proposed by the authors are listed in Table 2.

Table 2. Most cited frameworks of sustainable finance

<table>
<tr><th>Origin</th><th>Title</th><th colspan="3">Proposed Framework</th></tr>
<tr><td rowspan="4">(Schoenmaker, 2016)</td><td rowspan="4">Sustainable Finance Models (SFM)</td><td>Typologies</td><td>Values</td><td>Horizons</td></tr>
<tr><td>SFM 1.0</td><td>value created for Shareholder</td><td>Short term</td></tr>
<tr><td>SFM 2.0</td><td>value created for Stakeholder</td><td>Medium term</td></tr>
<tr><td>SFM 3.0</td><td>Common good value</td><td>Long term</td></tr>
<tr><td rowspan="4">(Ryszawska, 2018)</td><td rowspan="4">Transition in finance – multilevel perspective</td><td>Perspectives</td><td colspan="2">Characteristics</td></tr>
<tr><td>Landscape</td><td colspan="2">External trends and problems include the digital transition, social, environmental, and economic.</td></tr>
<tr><td>Dominant regime</td><td colspan="2">Short-term, profit-focused, limited risk perception</td></tr>
<tr><td>Niches</td><td colspan="2">Green, climate, carbon finance, innovations, fintech, green bonds, and green shares.</td></tr>
<tr><td rowspan="4">(Migliorelli, 2021)</td><td rowspan="4">Finance for sustainability</td><td>SF Landscape</td><td colspan="2">Characteristics</td></tr>
<tr><td>Operational and classification standards</td><td colspan="2">Unlabeled multilateral development banks funding sustainability-focused initiatives; green-labeled financial securities; socially labeled financial securities, products, and services.</td></tr>
<tr><td>Industry-originated frameworks</td><td colspan="2">ESG factors are considered while making investment decisions. These include impact financing and investing, sustainable and responsible investment (SRI), projects that adhere to the Equator Principles, and other frameworks developed by the industry.</td></tr>
<tr><td>Wider policy context</td><td colspan="2">Principles for positive impact finance: Sustainable development goals-aligned finance (SDG finance)-aligned investments, financing in line with the Principles for responsible banking (PRB), investments in line with the Paris Agreement, and government spending initiatives pertaining to sustainability.</td></tr>
</table>

Source: Authors' Literature Review

Challenges of Sustainable Finance

Ahlström & Monciardini (2021) highlight the array of regulatory, strategic, cultural, and accessibility challenges that plague sustainable finance at micro, mezzo, and macro levels. Macroeconomically, the financial sector's current rules do not sufficiently penalize non-sustainable business models while doing nothing to encourage sustainable business practices that follow ESG guidelines. Similar to this, corporate behavior and integrity are greatly influenced by the softer aspects of values and culture at the mezzo or the corporate level, which go beyond rules, laws, and principles. However, when it comes to including appropriateness in financial decision-making, corporate managers' inadequate sustainability literacy makes it necessary to overlook. Moreover, the successful application of optional norms and standards for sustainable finance by specific banks and service providers is still a major difficulty at the micro level, in addition to regulatory concerns.

According to Bengo, Boni & Sancino (2022), many financial institutions commit to sustainability declarations for reputational purposes but often fall short when it comes to actual implementation. The legitimacy and efficacy of sustainability concepts and criteria are further undermined by the lack of formalized independent monitoring and assessment. Thus, encouraging a change in the direction of integrating sustainability into financial institutions' corporate cultures is deemed an essential transformation. Furthermore, the perception of sustainability as a business opportunity at the corporate level remains insufficient, necessitating a systematic connection between sustainability factors and business success factors (Schoenmaker & Schramade, 2018).

Furthermore, even though it's critical to guarantee universal access to financial services, such as insurance, credit, and savings, at the micro level to promote pro-poor development, many societies continue to grapple with challenges stemming from credit market excesses. However, the economic history of developed nations has shown how sustainable finance supports equitable development (Gerster, 2011).

Finally, investment-wise, one significant issue in determining the viability of a sustainable project is evaluating the sustainability of the investment target. Edmans & Kacperczyk (2022) suggest that investors commonly rely on well-known ESG rating agencies. Nonetheless, the selection of a rating agency, from an academic standpoint, is not insignificant, and it is crucial to show reliability across various providers. For professionals, ESG ratings ought to be perceived as subjective assessments rather than objective facts, and responsible investors should refrain from selecting their target solely based on the rating of a single provider.

Sustainable Finance's Essential Ingredient

The digital revolution is considered a strong empowerment for the transformation in sustainability (Castilla-Rubio et al., 2016). More specifically, sustainable fintech business models are now a key component of the financial industry's development (Macchiavello & Siri, 2022). A sustainable fintech business model refers to a business model within the financial technology sector that incorporates sustainable practices and principles into its operations, products, and services (Fischer, 2021). Such models typically focus on utilizing technology to promote financial inclusion, environmental sustainability, social responsibility, and ethical practices (Chueca Vergara & Ferruz Agudo, 2021). This may involve offering digital solutions that promote responsible investing, green banking, and affordable and accessible financial services for underserved communities.

Fintech companies play a vital role in advancing sustainable finance, as they can leverage technology to tackle some of the problems and opportunities in this area. Macchiavello and Siri1 (2022), reviewed the literature and found that fintech can help achieve environmental objectives in various ways. First, by enabling retail funding for green initiatives, such as crowdfunding platforms and peer-to-peer lending. Second, by improving ESG reporting, verification, and ratings by using blockchain, artificial intelligence, big data, and algorithms to gather, process and analyze environmental data and information. Third, by providing innovative products and services that follow sustainability standards and criteria, such as Robo-advisors, Green Bonds, and Ecolabels.

In summary, by focusing on accountability, transparency, and sustainable development objectives, fintech may help the financial industry become more sustainable. It does this by leveraging cutting-edge technologies to have a positive effect on the financial industry as well as society at large (Fischer, 2021).

Opportunities and Attention Points for Main Players

According to Schoenmaker and Schramade (2019), financial markets have a history of giving priority to long-term value creation and, recently to sustainable development investments. Financial market players are seeking to highlight the role of various stakeholders, including investors, companies, and policymakers, in fostering a long-term perspective in all aspects of financial strategies and implementation. They are trying to enhance the engagement between investors and policymakers to encourage sustainable business practices and responsible behavior.

Based on our thorough analysis the opportunities and attention points of each mentioned player and stakeholder are described in Table 3.

Table 3. Attention Points of Sustainable Finance for Its Main Players

Main Players	Attention Points
Government	By striking a balance between a corporation's stakeholders' interests and the benefits of the environment and society, financial rules and policies play a significant role in encouraging the creation of lasting value and sustainable investing practices within the financial sector. Allocating Green loans to mitigate risk associated with investors to protect their investments (Schoenmaker & Schramade, 2018).
Banks	Specify which industries and initiatives are qualified for financing and which are not, along with their lending practices. Microfinancing: with the aim of sustainability initiatives and associations supporting ethical business. The establishment of sustainable banking standards by Multilateral Development Banks (MDBs) has drawn and encouraged green private finance (Mendez & Houghton, 2020).
Hedge funds	Hedge funds that support responsible investing gain real and monetary rewards, even though they perform worse than those that do not after controlling risk. When the typical culprits with no sustainable aims are taken out, responsible hedge funds draw far greater inflows. By accounting for risk, they draw in larger capital flows, amass more assets, and generate higher fees (Liang, Sun & Teo, 2022).
Socially responsible investors	Socially responsible investing (SRI) has grown in importance for investors and is no longer a niche topic. The goal of SRI is to incorporate non-financial factors into investment choices (Nikolakis, Cohen& Nelson, 2012).
Asset managers	In the United States and Europe, about 25% and 50%, respectively, of all assets under management (AUM) are invested in sustainable projects through socially conscious asset managers. Their most popular sustainable investment strategies are ESG integration and exclusionary screening. One is removing specific assets from the investing pool, typically those that are divisive in society. Alcohol, gambling, tobacco, and stocks of weapons—also referred to as sin stocks—are not included. In the latter, when choosing investments, ESG factors are considered (Zerbib, 2022).
Impact investors	They have demonstrated a propensity to draw businesses whose strengths are connected to labor relations, human rights, corporate governance, and their social standing in the community at large. They are also becoming increasingly conscious of firms' social performance (CSP). They opt to fund environmentally friendly businesses and initiatives that promote a circular economy and reduce carbon emissions (Roundy, Holzhauer & Dai, 2017).
Sustainable venture capital (VC) funds	They seek institutional and accredited investors for their committed capital. A limited partnership serves as the foundation for such a fund's conventional form. They employ ESG integration in conjunction with other conventional selection techniques when choosing and building portfolio firms (Lin, 2022).
Private equity (PE) sustainable funds	Market-driven, sustainable private equity funds are often formed in one of two ways: (1) by establishing a brand-new fund dedicated to sustainable investing. (2) through bringing an already-existing fund into an already sustainable industry (Lin, 2022).
Corporations/ corporate finances	The practice of businesses integrating funding to lower the likelihood of unfavorable events affecting those businesses is becoming more and more common in sustainable investing. At the management level, choices on investments and finance are made directly. They have to take into account how to assign financial resources to environmental management initiatives and activities, as well as how to gather resources to support ESG enhancements (Jabbour, 2013).

Risk managers	Financial institutions' risk management departments play a crucial role in addressing the inherent uncertainty surrounding environmental issues, such as worries about the timing and nature of climate mitigation initiatives as well as the potential effects of increased carbon emissions on the environment. They are increasingly using stress testing and scenario analysis to evaluate risk and profitability under various scenarios, such as the most adverse climate scenarios (Pyka & Nocoń, 2021).
Retail funds	Undertakings for Collective Investments in Transferable Securities (UCITS), which are aggregate investment schemes running independently throughout the European Union through a single authority, serve as the primary vehicle for retail investors (Alshaleel, 2016).

Source: Authors' Literature Review

Venture Capital In the Arena of Sustainable Finance

Many entrepreneurial startups are actively working together to address the worldwide challenge of climate change, focusing on initiatives such as reducing carbon dioxide, embracing renewable energy, and more. Achieving these goals necessitates more than just public funding or conventional financial resources. This is where venture capital, as the private source of funds, plays a crucial role by bridging the gap in entrepreneurial finance and providing support to sustainable-oriented startups (Dhayal et al., 2023). Since the 1980s, venture capital has developed into one of the most efficient sources for financing innovative activities and stimulating sustainable growth (Repullo & Suarez, 2004), and more recently, it has served as a crucial funding mechanism for sustainable entrepreneurship, thereby actively propelling sustainable development forward (Wöhler & Haase, 2022).

Critical analysis of this paper depicted the main strengths and weaknesses of these kinds of investors in the arena of sustainable finance, which are shown in tables 4 and 5.

Table 4. The strengths of VCs in the arena of sustainable finance

Origin	**Strengths**
(Dhayal et al., 2023)	In line with the 'triple bottom line' approach, venture capitalists have been concentrating their investment endeavors on startups and businesses that are involved in technological advances, green innovation, and cleantech. Green Venture Capital (GVC) firms are VCs that prioritize environmental conservation in a green manner.
(Przychodzen & Przychodzen, 2015; Cheng, Hua & Tan, 2019)	Venture capitalists tend to go towards eco-innovative ventures that yield better asset returns. The government has even designated a portion of venture capital investments as green R&D funds, which lower carbon emissions while boosting profitability.
(Geissdoerfer, Vladimirova & Evans, 2018)	The processes of learning and supervision that are integrated into venture capital activities can help organizations undergo organizational change, which can lead to the creation of sustainable competitive advantage through new business models.
(Cheng et al., 2019)	Businesses with venture capital backing are more likely to profit from the green premium that comes with favorable sustainable finance regulations.
(Rakotomavo, 2011)	Impact investors VCs are becoming more conscious of the social performance of businesses. They have demonstrated a propensity to draw businesses with a focus on labor relations, human rights, social performance in the community, and corporate governance.
(De Carvalho Ferreira et al., 2016)	VCs following the Social Investment Forum (SIF), considered the SRI principle of: (1) integrating ESG factors into investment choices; (2) protecting shareholders' interests regarding sustainability concerns and standards; and (3) coordinating amongst community

Origin	Strengths
	development initiatives to match their principles with the interests of the communities in which they operate.
(Zhang & Zhang, 2023)	Green VCs are considering their due diligence processes with the global standard by the seven principles of: (1) Screening that is negative or discriminatory; (2) screening that is positive or best-in-class; (3) norms-based examination; (4) integration of ESG; (5) investment with a focus on sustainability; (6) community investment; and (7) corporate participation and shareholder action.
(Lin, 2022)	Sustainable VC funds are known for their extended lock-in period, which serves well for sustainable startups in securing investment during a prolonged formation period. Furthermore, they contribute value to sustainable startups by offering technical expertise, industry connections, and management capabilities, thereby providing supplementary benefits alongside financial support. This facilitation allows portfolio companies to effectively commercialize advanced scientific breakthroughs essential for driving the innovation necessary for sustainable improvement. Consequently, it expedites the accessibility of sustainable justifications, thereby ushering in a range of environmental and social benefits.

Source: Authors' Literature Review

Table 5. The weakness of VCs in the arena of sustainable finance

Origin	Weakness
(Wöhler & Haase, 2022)	Sustainable startups often encounter difficulties in securing venture capital, primarily because traditional venture capitalists (tVCs) are more focused on investment opportunities that prioritize immediate returns rather than long-term impact. However, dedicated impact investors and VC funds show more interest in sustainable ventures.
(Randjelovic, O'Rourke & Orsato, 2003)	Although the advent of green venture capital (green VC) has been studied for decades, no national policy has yet to specifically support it.
(Cheng et al., 2019)	Updating the ten-year-old broad guidelines on green credit and green finance in the venture capital industry is necessary.
(Chow, 2011)	It is important to recognize that responsible investing is the best use of resources derived from an attitude of compassion and concern for the environment and community.
(Holland, 2011)	Publicizing, being transparent, and holding VCs accountable for their activities and initiatives in the ESG space remain issues.
(Nikolakis et al., 2012)	VC needs to consider non-financial factors in investment decisions.
(Markarian, Rakotobe & Semionov, 2023)	Fewer regulations and disclosures for PE and VCs have made them not fully report their (ESG) criteria, or ownership structure to the public and regulators. This makes it quite harder for investors, consumers, and policymakers to measure the social and environmental risks and impacts of these funds’ investments.

Source: Authors' Literature Review

CONCLUSION

This article presents a thorough and critical analysis of sustainability and the financial sector's role in advancing sustainable development, particularly in the field of sustainable entrepreneurship. Building on the insights from prior significant academic and professional works, the paper concludes that there exist numerous connections and opportunities to regard the financial system and its principles as fundamental pillars in achieving sustainable development. Notably, it emphasizes the institutional connections within capital markets and private financial sectors, specifically venture capital funds for promoting innovation and sustainable entrepreneurship.

According to this critical literature review, the paper concludes that sustainable finance is a multilevel process. Achieving the goal of sustainable development at the level of private financial markets needs a paradigm shift from profit maximization to sustainability facilitation. The paper suggests that the private financial markets, especially the venture capital sector, should play a key role in supporting this process by fostering a culture of innovation, resource efficiency, and sustainability among entrepreneurial ventures. Following are the stages that are typically involved in venture capital's comprehensive role in promoting entrepreneurship in the realm of sustainability.

Sustainable venture capital funds utilize their extensive due diligence, rights related to corporate governance, and supervision obligations to make sure that entrepreneurs honor their sustainability pledges. In their exit phase, green/sustainable VCs, with their established specialized sustainability board, can provide viable exit strategies to integrate the related startup into other sustainable-oriented corporations, along with enhanced standardization and comparability in the disclosure of sustainability information. Furthermore, when it comes to the final stage of startup financing, i.e., going to the IPO or M&A stages, establishing regulatory support with sustainable impact rating agencies is also a crucial step in ensuring that future potential investors remain confident about their involvement. Venture capital funds play a role in this process as well.

It is important to note that venture capitalists themselves tend to receive investment from a variety of sources, including banks, government agencies, institutional investors like university endowments and pension funds, and high-net-worth individuals (Lerner & Leamon, 2023). Hence, the bank, government, as well as endowments or pension funds, with their management's transparency to the public, can allocate green/sustainable loans, fundraise sustainable VCs, and specify their lending policies with reference to the industries and projects that venture capitalists can invest in, and hence make a huge contribution to the sustainable transition.

Additionally, venture capital funds that engage in socially responsible investing (SRI VCs) create a situation that benefits both themselves, their investment portfolios, and society as a whole by adopting SRI principles (De Carvalho Ferreira et al., 2016). By incorporating these principles, their sustainable investments demonstrate a sincere commitment to community welfare and environmental sustainability. This can be accomplished by fostering a culture that encourages them to implement effective strategies for responsible deal flow sourcing of investment opportunities, conducting thorough due diligence, ensuring fair valuation, and allocating resources to ESG-focused entrepreneurial prospects.

Finally, sustainable venture capitalists are pivotal in supporting sustainable fintech startups, which nowadays are known as the crucial element in fostering sustainable finance. Green/sustainable venture capitals and startup accelerators, with their group-based educational initiatives and mentorship for startups (Cohen et al., 2019) have mostly focused on fundraising and promoting early-stage fintech startups. They assist sustainable fintech startups in obtaining market validation, scalability, and visibility, which are crucial for drawing in additional investments and partnerships.

Their role extends beyond financial contributions, encompassing mentorship, network expansion, and the promotion of sustainable values, thereby fostering the viability and scalability of these innovative fintech ventures. Accelerator programs often provide valuable guidance from professionals in sustainable development, assisting fintech startup founders in refining their business models, creating effective strategies, and prevailing challenges. By strengthening the feasibility and impact of sustainable solutions and expediting the adoption of sustainable technologies, such startups attract the attention of additional investors and consumers. Green VCs commonly offer valuable industry knowledge and support, helping fintech startups navigate intricate market dynamics, regulatory demands, and technological progressions in sustainable finance. Often affiliated with significant funds, their partnerships with other financial entities like private equity facilitate fintech startups in accessing additional funding resources and ensuring their developmental phases.

In the past few decades, sustainable finance has gained increasing attention from business schools, financial institutions, and financial markets, and it will remain an important topic among them. As was also discussed earlier, academics and policymakers around the world recognize venture capital as one of the most critical forms of sustainable finance when it comes to funding entrepreneurial and innovative activities. There is a growing body of research verifying VC's importance in enterprise value creation, the construction of innovative classes, and the promotion of cleaner production. Despite this, some defects remain, which should be corrected shortly. Through the application of a comprehensive critical analysis in this paper, the researcher identified such gaps in the existing literature. Some of the primary gaps are outlined below.

One possible research focus could be on the application of innovative sustainable financing tools by venture capitalists to support sustainable entrepreneurship, including the exploration of green bonds, social impact bonds, and blended finance.

A further valuable recommendation involves investigating the contextual and cognitive aspects that impact the decision-making procedures of sustainable venture capital during due diligence and fundraising for ESG startups.

Furthermore, in the fields of sustainable finance and entrepreneurial finance, utilizing the capabilities of artificial intelligence, machine learning, and blockchain can also increase productivity, transparency, and creativity. In light of this, future scholars ought to probe these regions more thoroughly.

Exploring other sources of entrepreneurial finance, such as crowdfunding, angel investing, and corporate venture capital, and their influence in the realm of sustainable finance is another essential recommendation for future researchers.

Ultimately, the link between sustainable financing, private investment, and entrepreneurial activity in developing nations and emerging markets is still unclear, according to this critical examination of the literature. Therefore, it is advised that future researchers and pertinent authorities give careful thought to this matter and carry out inadequate studies addressing this crucial issue.

To sum up, achieving sustainable finance relies on the joint and integrated cooperation of all financial market players on both public and private levels. In order to support a sustainable transition and establish a sustainable financial system, they should collaborate closely with other economic, social, and environmental sectors. The outcome of such a system is the creation of reliable and long-lasting financial assets that would meet the long-term requirements of an environmentally conscious, inclusive economy.

ACKNOWLEDGMENTS

This research has been supported by Mr. Jim Bredemus, Head of ESG Risk and Regulations at Euroclear SA/NV, Brussels, Belgium.

REFERENCES

Ahlström, H., & Monciardini, D. (2021). The regulatory dynamics of sustainable finance: Paradoxical success and limitations of EU reforms. *Journal of Business Ethics*, 1-20.

Alshaleel, M. K. (2016). Undertakings for the collective investment in transferable securities directive V: Increased protection for investors. *European Company Law*, 13(1).

Balaban, M., Župljanin, S., & Ivanović, P. (2016). Sources of Finance for Entrepreneurship Development. *Economic Analysis*, 49(1-2), 48-58.

Bengo, I., Boni, L., & Sancino, A. (2022). EU financial regulations and social impact measurement practices: A comprehensive framework on finance for sustainable development. *Corporate Social Responsibility and Environmental Management*, 29(4), 809-819.

Berrou, R., Dessertine, P., & Migliorelli, M. (2019). An overview of green finance. The rise of green finance in Europe: opportunities and challenges for issuers. *Investors and Marketplaces*, 3-29.

Bocken, N. M. (2015). Sustainable venture capital–catalyst for sustainable start-up success. *Journal of Cleaner Production*, 108, 647-658.

Breuer, W., & Pinkwart, A. (2018). Venture capital and private equity finance as key determinants of economic development. *Journal of Business Economics*, 88, 319-324.

Castilla-Rubio, J. C., Zadek, S., & Robins, N. (2016). Fintech and sustainable development: Assessing the implications. *UNEP Inquiry*.

Cheng, C., Hua, Y., & Tan, D. (2019). Spatial dynamics and determinants of sustainable finance: Evidence from venture capital investment in China. *Journal of Cleaner Production*, *232*, 1148-1157.

Chow, C. (2011). Establishing a corporate sustainability monitoring tool using the shareholder engagement commitment indicator. *Journal of Sustainable Finance & Investment*, 1(3-4), 195-208.

Chueca Vergara, C., & Ferruz Agudo, L. (2021). Fintech and sustainability: do they affect each other. *Sustainability*, 13(13), 7012.

Cohen, S., Fehder, D. C., Hochberg, Y. V., & Murray, F. (2019). The design of startup accelerators. *Research Policy*, 48(7), 1781-1797.

Daly, H., & Farley J. (2011), *Ecological Economics: Principles and Applications*, Washington DC: Island Press.

De Carvalho Ferreira, M. C. R., Sobreiro, V. A., Kimura, H., & De Moraes Barboza, F. L. (2016). A systematic review of literature about finance and sustainability. *Journal of Sustainable Finance & Investment*, *6*(2), 112-147.

Dhayal, K. S., Giri, A. K., Esposito, L., & Agrawal, S. (2023). Mapping the significance of green venture capital for sustainable development: A systematic review and future research agenda. *Journal Of Cleaner Production*, 396.

Di Vaio, A., Hassan, R., Chhabra, M., Arrigo, E., & Palladino, R. (2022). Sustainable entrepreneurship impact and entrepreneurial venture life cycle: A systematic literature review. *Journal of Cleaner Production*, 134469.

Dziawgo, L. (2014). Greening financial market. *Copernican Journal of Finance & Accounting*, *3*(2), 9-24.

Edmans, A., & Kacperczyk, M. (2022). Sustainable finance. *Review of Finance*, 26(6), 1309-1313.

Fischer, M. (2021). *Fintech business models: applied canvas method and analysis of venture capital rounds.* de Gruyter.

Fullwiler, S., (2016). Building a more general theory of finance. *Routledge Handbook of Social and Sustainable Finance*, 17.

Geissdoerfer, M., Vladimirova, D., & Evans, S. (2018). Sustainable business model innovation: A review. *Journal of cleaner production*, *198*, 401-416.

Gerster, R. (2011). Sustainable finance: Achievements, challenges, outlook. *Striking a Balance Ahead of Rio*, *20*.

Guang-Wen, Z., Murshed, M., Siddik, A. B., Alam, M. S., Balsalobre-Lorente, D., & Mahmood, H. (2023). Achieving the objectives of the 2030 sustainable development goals agenda: Causalities between economic growth, environmental sustainability, financial development, and renewable energy consumption. *Sustainable Development*, *31*(2), 680-697.

Guo, Q., Su, Z., & Chiao, C. (2021). Carbon emissions trading policy, carbon finance, and carbon emissions reduction: evidence from a quasi-natural experiment in China. *Economic Change and Restructuring*, 1-36.

Holland, J. (2011). A conceptual framework for changes in fund management and accountability relative to ESG issues. *Journal of Sustainable Finance & Investment*, *1*(2), 159-177.

Jabbour, C. J. C. (2013). Environmental training in organizations: From a literature review to a framework for future research. *Resources, Conservation and Recycling*, *74*, 144-155.

Johnson, M. P., & Schaltegger, S. (2020). Entrepreneurship for sustainable development: A review and multilevel causal mechanism framework. *Entrepreneurship Theory and Practice*, 44(6), 1141-1173.

Junior, M. L., & Godinho Filho, M. (2010). Variations of the kanban system: Literature review and classification. *International Journal of Production Economics*, 125(1), 13-21.

Labatt, S., & White, R. R. (2011). *Carbon finance: the financial implications of climate change*. John Wiley & Sons.

Lerner, J., & Leamon, A. (2023). *Venture capital, private equity, and the financing of entrepreneurship*. John Wiley & Sons.

Li, Y., Zhang, Y., & Solangi, Y. A. (2023). Assessing ESG Factors and Policies of Green Finance Investment Decisions for Sustainable Development in China Using the Fuzzy AHP and Fuzzy DEMATEL. *Sustainability*, 15(21), 15214.

Liang, H., Sun, L., & Teo, M. (2022). Responsible hedge funds. *Review of Finance*, 26(6), 1585-1633.

Lin, L. (2022). Venture capital in the rise of sustainable investment. *European Business Organization Law Review*, 23(1), 187-216.

Macchiavello, E., & Siri, M. (2022). Sustainable finance and fintech: Can technology contribute to achieving environmental goals? A preliminary assessment of 'green fintech 'and 'sustainable digital finance'. *European Company and Financial Law Review*, 19(1), 128-174.

Mansouri, S., & Momtaz, P. P. (2022). Financing sustainable entrepreneurship: ESG measurement, valuation, and performance. *Journal of Business Venturing*, 37(6), 106258.

Mareels, D. (2018). *Sustainable Finance: Taxonomy and Benchmarks*. European Commission: Brussels.

Markarian, G., Rakotobe, C., & Semionov, A. (2023). ESG in the Top 100 US Private Equity Firms. *SSRN 4503661*.

Mazzucato, M., & Penna, C. C. (2015). *The rise of mission-oriented state investment banks: the cases of Germany's KfW and Brazil's BNDES.* SPRU Working Paper Series.

Mendez, A., & Houghton, D. P. (2020). Sustainable banking: the role of multilateral development banks as norm entrepreneurs. *Sustainability*, *12*(3), 972.

Migliorelli, M. (2021). What Do We Mean by Sustainable Finance? Assessing Existing Frameworks and Policy Risks. *Sustainability*, *13*(2), 975.

Nikolakis, W., Cohen, D. H., & Nelson, H. W. (2012). What matters for socially responsible investment (SRI) in the natural resources sectors? SRI mutual funds and forestry in North America. *Journal of Sustainable Finance & Investment*, *2*(2), 136-151.

Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, 142(2), 550-571.

Pranckutė, R. (2021). Web of Science (WoS) and Scopus: The titans of bibliographic information in today's academic world. *Publications*, 9(1), 12.

Przychodzen, J., & Przychodzen, W. (2015). Relationships between eco-innovation and financial performance–evidence from publicly traded companies in Poland and Hungary. *Journal of Cleaner Production*, *90*, 253-263.

Pyka, I., & Nocoń, A. (2021). Banks' capital requirements in terms of implementation of the concept of sustainable finance. *Sustainability*, 13(6), 3499.

Rakotomavo, M. T. (2011). Preferences of retail investors and institutions for corporate social performance. *Journal of Sustainable Finance & Investment*, *1*(2), 93-102.

Randjelovic, J., O'Rourke, A. R., & Orsato, R. J. (2003). The emergence of green venture capital. *Business strategy and the environment*, *12*(4), 240-253.

Repullo, R., & Suarez, J. (2004). Venture capital finance: A security design approach. *Review of finance*, 8(1), 75-108.
Robertson, I. (2020). *Principles of sustainable finance: by Dirk Schoenmaker and Willem Schramade*, Oxford: Oxford University Press,
Ryszawska, B. (2018). Sustainable finance: paradigm shift. *Finance and Sustainability* (pp. 219-231). Springer, Cham.
Roundy, P., Holzhauer, H., & Dai, Y. (2017). Finance or philanthropy? Exploring the motivations and criteria of impact investors. *Social Responsibility Journal*, 13(3), 491-512.
Schoenmaker, D. (2016). Investing for the common good: A sustainable finance framework. *Brussels: Bruegel*, 80.
Schoenmaker, D., & Schramade, W. (2019). Investing for long-term value creation. *Journal of Sustainable Finance & Investment*, 9(4), 356-377.
Schoenmaker, D., & Schramade, W. (2018). *Principles of sustainable finance*. Oxford University Press.
Scholtens, B. (2006). Finance as a driver of corporate social responsibility. *Journal of business ethics*, *68*(1), 19-33.68(1), 19–33.
Schütze, F., & Stede, J. (2021). The EU sustainable finance taxonomy and its contribution to climate neutrality. *Journal of Sustainable Finance & Investment*, 1-33
Strandberg, C. (2005). Best practices in sustainable finance. *Strandberg Consulting*.
Stewart, R. B., Kingsbury, B., & Rudyk, B. (2009). *Climate finance: Regulatory and funding strategies for climate change and global development*. NYU Press.
Todorović, Z. (2018). Green economy and indicators of sustainable and ecological development. *Economic Analysis*, (1-2), 103-119.
Whiteman, G., Walker, B., & Perego P. (2013) Planetary Boundaries: Ecological Foundations for Corporate Sustainability. *Journal of Management Studies* 50(2): 307-336.
Wöhler, J., & Haase, E. (2022). Exploring investment processes between traditional venture capital investors and sustainable start-ups. *Journal of Cleaner Production*, 377, 134318.
Guez, H., & Zaouati, P. (2017). *Positive Finance: A Toolkit for Responsible Transformation.* Paris: Routledge.
Zerbib, O. D. (2022). A sustainable capital asset pricing model (S-CAPM): Evidence from environmental integration and sin stock exclusion. *Review of Finance*, 26(6), 1345-1388.
Zhang, C., & Zhou, B. (2023). Where should the money go? The green effect of governmental guidance when sustainable finance impacts brown firms. *Pacific-Basin Finance Journal*, *78*, 101961.
Ziolo, M., Filipiak, B. Z., Bąk, I., Cheba, K., Tîrca, D. M., & Novo-Corti, I. (2019). Finance, sustainability, and negative externalities. An overview of the European context. *Sustainability*, *11*(15), 4249
Ziolo, M., Bak, I., & Cheba, K. (2021). The role of sustainable finance in achieving Sustainable Development Goals: does it work? *Technological and Economic Development of Economy*, *27*(1), 45-70.

Article history:	Received: 22.11.2023.
	Revised: 5.12.2023.
	Accepted: 8.12.2023.