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GREEN FINANCE INSTRUMENTS AND THE SUSTAINABLE DEVELOPMENT GOALS ACHIEVEMENT IN DEVELOPING COUNTRIES: A SYSTEMATIC LITERATURE REVIEW[1]

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Abstract

Green financing has emerged as a fundamental segment worldwide, playing a relevant role in pursuing the Sustainable Development Goals (SDGs). As the world faces complex environmental, economic, and social challenges, green finance stands out as a tool to drive the transition towards a more sustainable economy. The present work aimed to systematically review studies on green finance to explore scientific production in this area to identify the existing green finance instruments that can be used in developing countries, and their contributions to the SDGs achievement. We analyzed 37 studies and through a bibliometric analysis, we identified the most significant networks and areas studied by authors. Content analysis contributed to identifying 46 green financing instruments in this context, distributed in 7 categories: Government Financing, Funds, Private/non-state investment, Public-Private Partnership, Financial Institutions, Capital Markets, and Direct Foreign Investment. This review showed that 12 of the 17 SDGs can be funded through green finance instruments, however, it was found that most studies are focused on climate change goals, resulting in a significant gap in how to promote these instruments to target other SDGs more effectively in developing countries. The insights obtained can contribute to government strategies, and with the development of more effective public policies facing environmental challenges and advancing towards the SDGs.

Keywords: Climate Goals; Developing Countries; Green Finance; Public Policies; Sustainable Development Goals.

Resumo

O financiamento verde emergiu como um segmento fundamental a nível mundial, desempenhando um papel relevante na busca pelos Objetivos de Desenvolvimento Sustentável (ODS). À medida que o mundo enfrenta desafios ambientais, econômicos e sociais complexos, o financiamento verde destaca-se como uma ferramenta para impulsionar a transição para uma economia mais sustentável. O presente trabalho teve como objetivo revisar sistematicamente estudos sobre finanças verdes para explorar a produção científica nesta área para identificar os instrumentos de financiamento verde existentes, e que podem ser usados nos países em desenvolvimento, assim como aponta suas contribuições para o alcance dos ODS. Revisamos 37 estudos, e por meio de análise bibliométrica, identificamos as redes e áreas mais significativas estudadas pelos autores. A análise de conteúdo contribuiu para identificar 46 instrumentos de financiamento verde neste contexto, distribuídos em 7 categorias: Financiamento Governamental, Fundos, Investimento Privado/não estatal, Parceria Público-Privada, Instituições Financeiras, Mercado de Capitais e Investimento Estrangeiro Direto. Esta revisão mostrou que 12 dos 17 ODS podem ser financiados através de instrumentos de financiamento verde, no entanto, constatou-se que a maioria dos estudos se concentra no ODS 13 (mudanças climáticas), resultando numa lacuna significativa sobre como promover estes instrumentos para atingir de forma mais eficaz outros ODS nos países em desenvolvimento. Os *insights* obtidos podem colaborar para estratégias governamentais, contribuindo para a elaboração de políticas públicas mais eficazes no enfrentamento dos desafios ambientais e no avanço em direção ao alcance dos ODS's.

Palavras-chave: Finanças Verdes; Metas Climáticos; Objetivos de Desenvolvimento Sustentável; Países em Desenvolvimento; Políticas Públicas.

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INTRODUCTION

Green finance has emerged as a crucial response to the widening gap between economic growth and global social and environmental concerns. This disparity has resulted in a myriad of adverse effects, including heightened energy consumption, unsustainable resource exploitation, environmental degradation, climate change, and social issues such as inequality and the repercussions of rampant consumerism. In this context, green finance stands out as an indispensable tool for fostering sustainable development. Its objective is to incorporate environmental and social considerations into financial decision-making processes, redirecting resources towards projects and initiatives that not only spur economic growth but also champion environmental protection and social equity.

Notably, green finance plays a pivotal role in advancing the Sustainable Development Goals (SDGs), particularly in developing countries grappling with significant challenges in finding sustainable solutions to socioeconomic and environmental issues. By channeling financial resources towards projects aligned with the SDGs, green finance can catalyze progress in critical areas such as education, healthcare, renewable energy, sustainable infrastructure, and poverty eradication.

In light of this context and to explore scientific advancements in the field of study, the following research problem arises: "What green finance instruments can be leveraged to attain the SDGs in emerging markets?" This study delves into the international scientific literature on green finance through a Systematic Literature Review (SLR) and content analysis, supplemented by bibliometric methods, to examine data and map out the available green finance instruments applicable in developing nations. Additionally, it aims to assess their potential contributions toward realizing the SDGs.

Despite the existing body of research on green finance, much of it has been centered on developed nations, leaving significant gaps regarding its applicability and effectiveness in less industrialized regions. Developing countries, which often face the greatest financial challenges in implementing sustainable infrastructure, are also among the most vulnerable to the impacts of climate change. Therefore, there is a need to explore how green finance can be tailored to these contexts to support their sustainable development efforts.

This paper is significant as it endeavors to fill this gap, consolidating and integrating knowledge about green financing instruments within emerging economic contexts. Beyond its academic contributions, this research serves as a crucial resource for enhancing public policies in developing nations. By elucidating green financing instruments, it offers concrete insights for discussions surrounding the practical implementation of government strategies geared towards sustainability. The identification of trends, gaps, and patterns within this literature corpus is paramount for charting the current landscape of knowledge and offering valuable insights for researchers, policymakers, and

practitioners alike. Moreover, by highlighting the addressed instruments and their potential contributions to the SDGs, the review presents a comprehensive overview of existing practices and avenues for progress. Thus, the intrinsic significance of this review lies in its ability to unite and synthesize existing knowledge, fostering a more holistic and well-informed understanding of green finance initiatives in developing countries.

Following this introductory section, the paper is structured as follows: Section 2 introduces the conceptual framework, outlining the theoretical underpinnings of the study. Section 3 delineates the methodology employed for the SLR, providing a detailed exploration of the research approach utilized. In Section 4, the results derived from the SLR are presented, followed by a discussion on the identified green finance instruments and their potential contributions to the achievement of the SDGs. Lastly, Section 5 encapsulates the main conclusions drawn from the analysis and underscores opportunities for further research aimed at advancing knowledge in the field.

CONCEPTUAL FRAMEWORK

The decoupling between economic growth and social and environmental issues has generated negative impacts throughout the world, such as excessive energy consumption, high resource exploitation, environmental pollution, climate change, social problems, inequality, and consumerism, among others (ELAHI *et al*. 2022; HIRSCH, 2023), thus becoming a significant obstacle to sustainable development.

In this scenario, sustainability-related themes have consistently surfaced in academic discussions and garnered international focus, fostering collaboration among nations toward the advancement of financing initiatives geared towards sustainability transition. This concept, referred to in this work as "green financing," underscores the collective endeavor to facilitate the shift towards sustainable practices. In this sense, the discussion about which instruments enable green financing has received increasing attention in the last decade due to its importance in international cooperation agreements and the formulation of national policies mainly focused on the climate crisis (MARIA *et al*., 2023).

Green financing emerges as a facilitator in combating environmental threats and damages and its origin can be portrayed from the concept of a green economy (BHATNAGAR; SHARM, 2022). Its concept emerged around the 2010s, considered future-oriented financing aimed at developing the financial industry, improving the environment, and economic growth (NOH, 2018). Several groups and organizations seek to develop a more structured definition for green finance, treating it as a form of financing that aims to promote environmental benefits, such as reducing air, water, and land pollution,

reducing greenhouse gas emissions (GHG), promoting greater energy efficiency, among others (GREEN FINANCE STUDY GROUP, 2016).

Green finance has a broad concept that includes sustainable finance (socially inclusive green projects), environmental finance (environmental protection), carbon finance (emissions reduction), and climate finance (adaptation and mitigation of climate change) (NOH, 2018). In general, we can divide it into two broad categories, climate financing and sustainability financing (ZHANG *et al*., 2019).

The latter encompasses a diverse array of specific financial instruments, ranging from private loans to insurance, shares, derivatives, and tax or investment funds (NOH, 2018). Maria *et al*. (2023) illustrate that a substantial portion of the literature conceptualizes green finance as a collection of various financial instruments and policies designed to foster sustainable development, engaging both financial and non-financial institutions. Within the banking sector, financial products and services are increasingly integrating environmental considerations into decision-making processes, with the aim of facilitating environmentally responsible investments and promoting the adoption of low-carbon technologies, projects, industries, and businesses (SONI, 2018).

The G20 Insights on Climate Policy and Finance defines green financial instruments as "all forms of investment or lending that consider the environmental effect and increase environmental sustainability" (BERENSMANN *et al*., 2017). Based on the literature, its main operations include green bonds, microfinance, sustainable funds, impact investments, active ownership, credits for environmental sustainability, and improvement of entire financial systems (GUANG-WEN; SIDDIK, 2022).

With the emergence of the SDGs in 2015, a set of global goals for sustainable development agreed by the United Nations (STEFANI *et al.*, 2023), the signatory countries verified the need to move financial resources to invest in the pursuit of the 17 SDGs goals (PIZZI *et al*., 2021), placing green financing in a prominent role.

According to Soundarrajan and Vivek (2016), green finance aims to strategically include the financial sector in the transition in search of more optimized economies with lower emissions. It is clear, then, that promoting green financing is essential for countries to be able to contribute to actions and achieve the SDGs, especially for developing nations (LIU *et al*., 2020).

Despite existing contributions to green finance, the topic is broad and there is still diversity to explore. Past publications on the field have focused on developed countries, causing gaps when relating to less industrialized/developing countries (DEBRAH *et al*., 2022), which in turn, face the biggest financial problems in promoting the infrastructure changes needed to promote the achievement of the SDGs (SHANG *et al*., 2023). Thus, it is clear that, regarding the context of developing countries, the field of study is in its incipient.

METHODOLOGY

The systematic review followed the PRISMA methodology (MOHER *et al*., 2010). A flowchart visually represented the paper selection process, indicating the total papers identified and their inclusion or exclusion (SILVA; QUEIROZ; GIMENES, 2024). The research used the SYSMAP Model (Scientometric and Systematic Yielding Mapping Process) for structured analysis, facilitating evaluation and identification of gaps (VAZ; URIONA-MALDONADO, 2017). The SYSMAP Model involves five stages: Corpus compilation; Filtering; Scientometric and content analysis; and Identifying gaps and opportunities.

To broaden coverage, keywords beyond "green finance" were selected based on Noh (2018) definition, including "sustainable finance," "environmental finance," "carbon finance," and "climate finance." Following the Joanna Briggs Institute (JBI) recommendations, the research question and keywords were formulated using the PICo strategy, as depicted in Table 1.

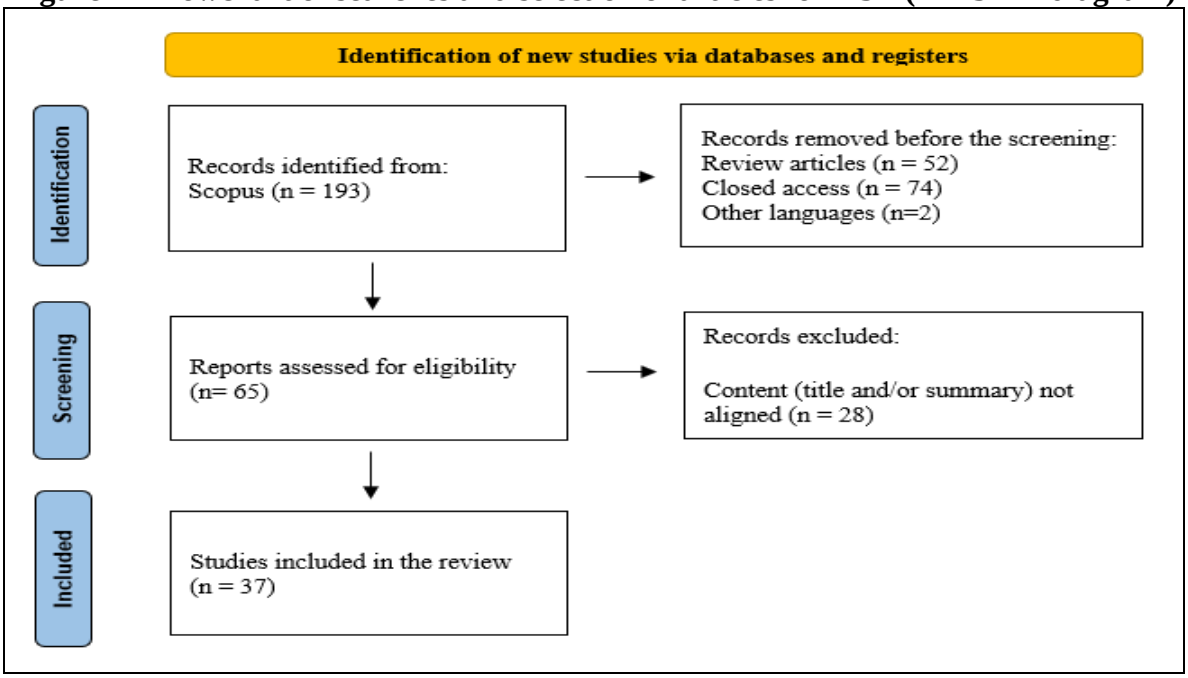
Table 1 - PICo strategy for defining keywords

	Problem	Interest	Context
Conversion	Green finance	Sustainable Development Goals	emerging markets
Combination	“Green finance” “Sustainable finance” “Environmental finance” “Carbon finance” “Climate finance”	“Sustainable Development Goals” “Sustainable Development” “sustainability” “Green Deal”	"Emerging markets" "Emerging country" "Emerging economy" "Developing country"
Use	(“Green financ*” OR “sustainable financ*” OR “Environmental financ*” OR “carbon financ*” OR “climate financ*”) AND (“Sustainable Development Goals” OR “Sustainable Development” OR “sustainability”) AND ("emerging market*" OR "emerging countr*" OR "emerging econom*" OR "developing countr*")		

Source: Self elaboration.

The searches were carried out in the Scopus database, in June 2023, and no temporal limitation or other filters were applied, returning a total of 193 publications. Filters were subsequently applied to specify the sample with only open-access papers as well as in the English language, resulting in a total of 65 papers. With the help of Rayyan software, the inclusion/exclusion process was held to check the framing/alignment of the papers with the research objective, excluding those that did not deal with the theme of green finance, resulting in 37 papers as a final sample (Figure 1).

Figure 1 - Flowchart of searches and selection of articles for RSL (PRISMA diagram)



Source: Self elaboration.

After determining the sample, a survey of descriptive data was carried out to identify the number of papers, their evolution in each year, and which authors and keywords were most recurrent. Next, the VOSviewer software was used, a tool that helps in the creation and visualization of bibliometric data networks, which can be explored and analyzed, demonstrating the current situation, and helping to investigate possible research gaps.

Subsequently, a content analysis was carried out on the 37 articles belonging to the corpus to identify which green finance instruments were being implemented in developing countries according to the literature.

RESULTS AND DISCUSSION

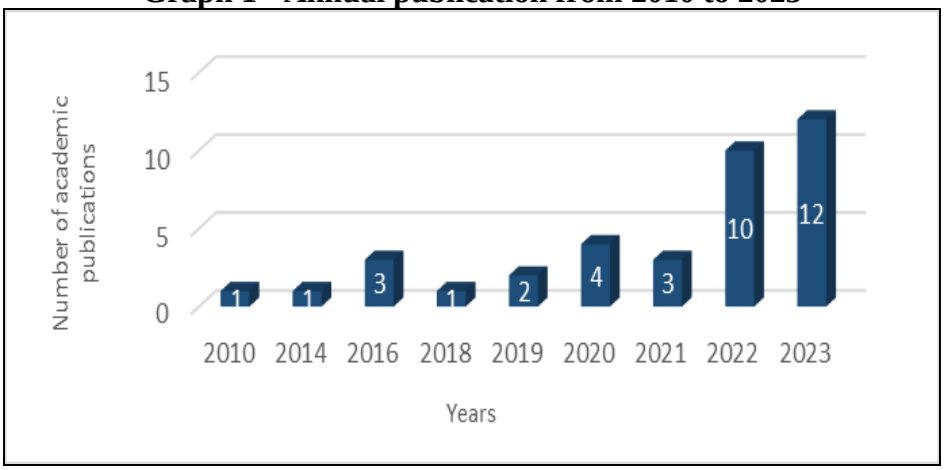
This section explores a comprehensive and systematic analysis of the selected RSL corpus. The first subsection presents the trajectory of academic production over time, outlining the main trends, milestones, and changes in the emphasis on the specific proposed theme, allowing a deeper understanding of the emerging thematic areas and the contributions that have been shaping the field.

The second subsection focuses on bibliometric analysis, seeking to identify co-authorship patterns, collaboration networks, and citation patterns among relevant studies. Finally, in the last part, a thorough content analysis of the selected corpus was conducted, to answer the research question.

Field production evolution

Graph 1 presents an annual analysis of the academic publications on the topic, considering the sample period between 2010 and 2023. The results reveal a dynamic panorama of engagement and interest in this emerging field.

Graph 1 - Annual publication from 2010 to 2023



Source: Self elaboration.

The collected sample indicates that publications regarding green finance and its contributions to sustainability, particularly in developing countries, began to emerge around 2010. This emergence can be attributed to various factors. Notably, the transition to a new phase of expansion in the field coincided with the outcomes of the Kyoto Protocol, which marked the initiation of efforts dedicated to its evaluation and implementation (MARIA *et al.*, 2023). Additionally, 2010 witnessed the establishment of the Green Climate Fund (GCF), the largest global climate fund aimed at supporting developing countries in implementing low-emission and climate-resilient initiatives.

However, despite these developments, research in this area did not exhibit significant growth during this period. It wasn't until the adoption of the Paris Agreement in 2015 that a notable resurgence in publications on the subject occurred. Although research on green finance began to receive increased attention following this milestone, publications addressing its implications for developing countries remained relatively low until 2021, displaying fluctuations over the years.

The year 2021 marked a significant turning point, with a notable upsurge in publication rates. This increase coincided with commitments made under the United Nations Framework Convention on Climate Change, wherein developed countries pledged to provide climate finance to assist developing nations in addressing climate change and transitioning to low-carbon economies. Despite these commitments formalized in the Paris Agreement, the promise to mobilize US$100 billion annually by

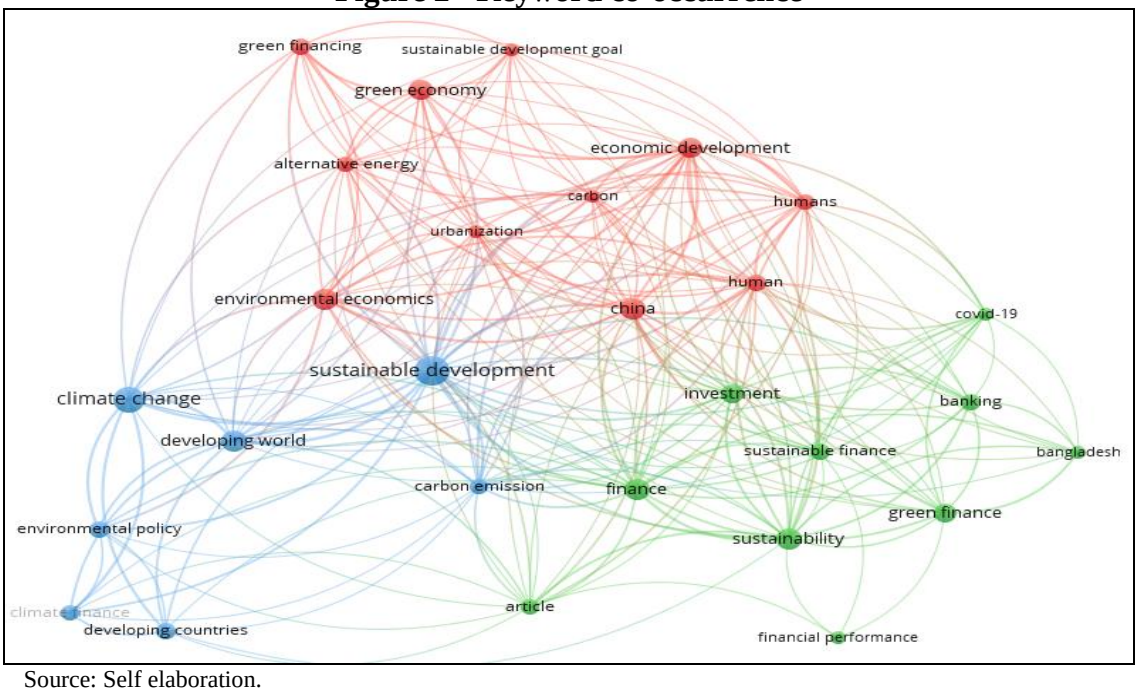
2020 remained unfulfilled as of 2023, with a postponed deadline. This discrepancy likely sparked debates and discussions concerning global climate financing, leading to renewed interest in research aimed at understanding the consequences of this gap and its impact on sustainable development strategies worldwide.

From 2021 onward, there has been a notable surge in scientific production, with a peak in intensity observed in 2023. This surge indicates that while the topic of green finance is broad, research involving its collaboration for sustainability in emerging countries remains a relatively recent field. Consequently, it enables the identification of gaps in the literature that can be explored and debated across various domains of knowledge to expand and consolidate research in this field.

Bibliometric analysis

Keyword co-occurrence analysis was a research technique used to identify patterns of association between keywords frequently used together, understanding which terms are related and appear together more frequently can help in the development of insights into the semantic and thematic connections between the concepts covered in the analyzed texts. A network was built based on the keywords used in the papers, considering the co-occurrence of at least 3 terms, resulting in 28 items divided into 3 clusters, as shown in Figure 2.

Figure 2 - Keyword co-occurrence



Source: Self elaboration.

In general, "sustainable development" and "climate change" emerge as the most frequently used terms within the literature examined. This suggests their central importance and widespread discussion in publications on green finance and sustainability in developing countries, where efforts aim to reconcile economic growth with climate change mitigation and environmental sustainability.

The identified groups are relatively balanced in size. Cluster 1 (red), comprising 11 items, focuses on carbon emissions, economic and environmental development, and renewable energy alternatives. Research associated with this cluster emphasizes reducing carbon emissions, promoting sustainable economic development, and exploring renewable energy alternatives to address global environmental challenges.

Cluster 2 (green), consisting of 10 items, emphasizes financial and banking aspects of the green economy, alongside the impact of the COVID-19 pandemic. This cluster suggests a particular interest in exploring the role of the financial sector in promoting the green economy and how the pandemic has influenced sustainability-related financial dynamics.

Cluster 3 (blue), with 7 items, examines the relationship between sustainability, carbon emissions, environmental policies, and climate finance. This cluster may reflect a holistic approach to understanding how environmental sustainability intersects with government policies and financial practices, while also exploring finance's role in mitigating carbon emissions and reducing climate change impacts. Additionally, the mention of specific countries like China and Bangladesh in the clusters suggests a focus on these locations within the context of developing countries.

Overall, the utilization of green financing to address climate change issues indicates alignment with the SDGs in developing countries. The identification of three distinct clusters suggests a comprehensive and multidimensional approach to the field, reflecting the convergence of economic, environmental, and financial concerns. This underscores the complexity and interconnectedness of these areas, with specific interest in pioneering countries like China in the realm of green finance (DIKAU; VOLZ, 2023).

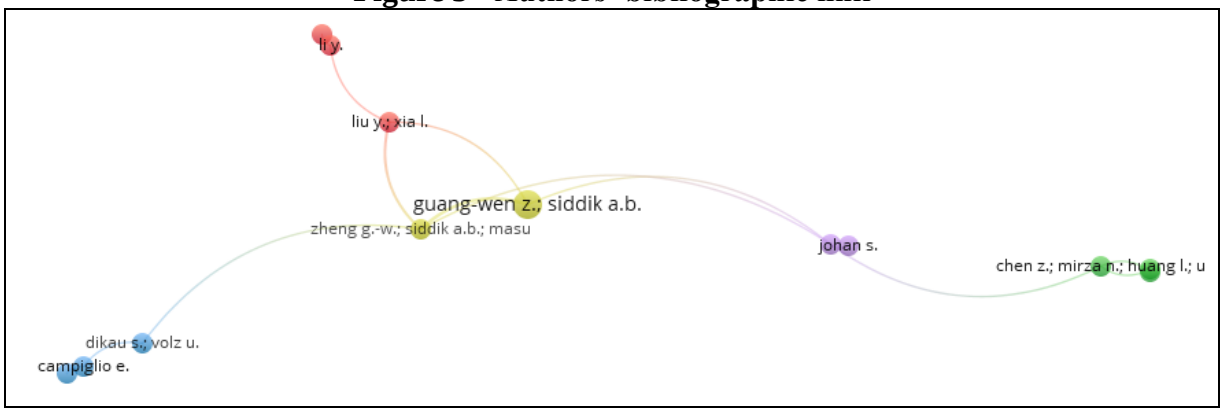
Bibliographic Coupling Analysis

Bibliographic coupling serves as an analytical technique to explore the interconnections among various scientific documents by examining the citations they mutually receive. This method sheds light on the relationships between documents based on shared bibliographic references, aiding in the comprehension of knowledge network evolution within specific fields. It facilitates the identification of patterns of relationship and influence among documents.

The collection of references utilized by authors in their research reflects the intellectual landscape within each field. When papers share similar bibliographies, it implies an implicit relationship between them (KESSLER, 1965). This approach enables the understanding of structural relationships, theoretical-methodological connectivity, as well as the proximity and association between documents and researchers (TELECHI; NOVELLI, 2021).

The objective of employing bibliographic coupling in this context is to gauge the proximity between documents within the sample. The greater the number of shared references, the stronger the connection between them. Initially, a bibliographic coupling network was constructed among authors, resulting in 33 interactions segmented into 5 clusters. Figure 3 illustrates this network.

Figure 3 - Authors' bibliographic link



Source: Self elaboration.

The analysis of bibliographic coupling among authors revealed five distinct clusters, with three clusters comprising three authors each, and the remaining two clusters containing two authors each. This visual representation offers an initial insight into the relationships and collaborations between authors, providing an understanding of the mutual influences that can arise from these connections.

Cluster 4 (yellow) exhibits the strongest connections, particularly between authors Guang-Wen and Siddik, who published works in 2022 and 2023, and Zheng, Siddik, Masukujjaman, and Fátima, with research from 2021, focusing specifically on the banking sector in Bangladesh. The group emphasizes the persistent research gap concerning the impact of green finance dimensions on the sustainable performance of banking institutions. Their study analyzes the effects of Corporate Social Responsibility and green finance dimensions on the sustainability performance of financial institutions in developing economies, specifically in Bangladesh. The results are deemed relevant, offering guidance to banking institution managers to enhance internal resources such as Corporate Social Responsibility initiatives and green financing to improve environmental performance. The authors suggest future research directions, including larger sample sizes, expanding to other countries and industries,

examining the pandemic's impact, considering external stakeholders, and employing advanced statistical approaches.

Authors associated with Cluster 1 (red) focus on renewable energy and energy efficiency, with significant connections to green finance. They highlight green financing's pivotal role in energy efficiency through investments in sustainable projects, utilizing instruments such as government subsidies, public financing, green credit, sustainable bonds, green loans, and green bonds. Further studies are needed to comprehensively assess the environmental, economic, and social benefits of green productivity expansion and explore the correlation between additional indicators and energy efficiency.

Cluster 2 (green) addresses various aspects, including establishing guarantees for environmental recovery initiatives and their effects on achieving sustainable development goals. The cluster encompasses studies on green financial institutions/banks, ecological financing, renewable energy, and factors influencing green financial constraints. Financial institutions, especially in emerging economies, can support environmental recovery by providing guarantees for sustainability-focused initiatives, contributing significantly to achieving sustainable development goals. In these markets, banking institutions can direct funds to borrowers aligned with environmentally conscious practices, thereby supporting green recovery efforts through instruments such as green loans.

Another aspect discussed is the inclination to invest in renewable energy projects, influenced by attitudes, subjective norms, perceptions of investment attitudes, and evaluations of regulatory structures. Interestingly, there is no indication that investment desire is affected by risk aversion. Moreover, funding instruments for climate actions that can foster the growth of the solar energy industry are examined, such as the Clean Development Mechanism (CDM) and the Global Environment Facility (GEF).

In the context of Cluster 2, it is emphasized that poor air quality can escalate government pressure for environmental protection, prompting companies, particularly in emerging economies where local governments have greater influence or environmental regulations are less stringent, to seek financing for investments and transitions toward sustainable practices. Instruments facilitating access to financing for sustainable investments and transitions of companies are also highlighted, including green bonds, green debt financing, and the Air Pollution Prevention and Control Action Plan, which mandates banks to ease access to financing for green projects, among others.

Cluster 3 focuses on low-carbon and monetary policies aiming to enhance sustainable financing and mitigate climate change and related risks. Discussions on integrating sustainable financial practices include the relevance of monetary policies and macroprudential financial regulation. Campiglio (2016) explores utilizing international climate policy instruments, such as revenue from carbon trading, to

foster the transition toward a low-carbon society. Dikau and Volz (2021) underscore the application of monetary policy, including the "guidance window," to encourage financial institutions to extend credit to sustainable activities while restricting loans to environmentally impactful sectors. Additionally, green financial products like sustainable financing, green loans, green investments, and green bonds are highlighted as tools to facilitate credit for sustainable activities and stimulate a sustainable economic transition.

Cluster 5, composed of authors Johan (2022) and Talha (2023), delves into case studies in Indonesia and China, emphasizing the significance of green financing in achieving sustainability through sustainable policies, low carbon, and energy conservation. Both studies underscore the intersection between sustainable finance and sustainable economic development, recognizing finance as a vital tool for driving the transition to more environmentally and socially responsible practices. Furthermore, they explore various financial instruments to promote the SDGs, such as green financing, green bonds, and carbon market mechanisms, stressing the importance of aligning investments and financial policies with economic growth, social well-being, and environmental goals. The group suggests further research considering environmental commitment and stakeholder pressure within a theoretical framework, including employing qualitative methods to delve deeper into the green innovation process.

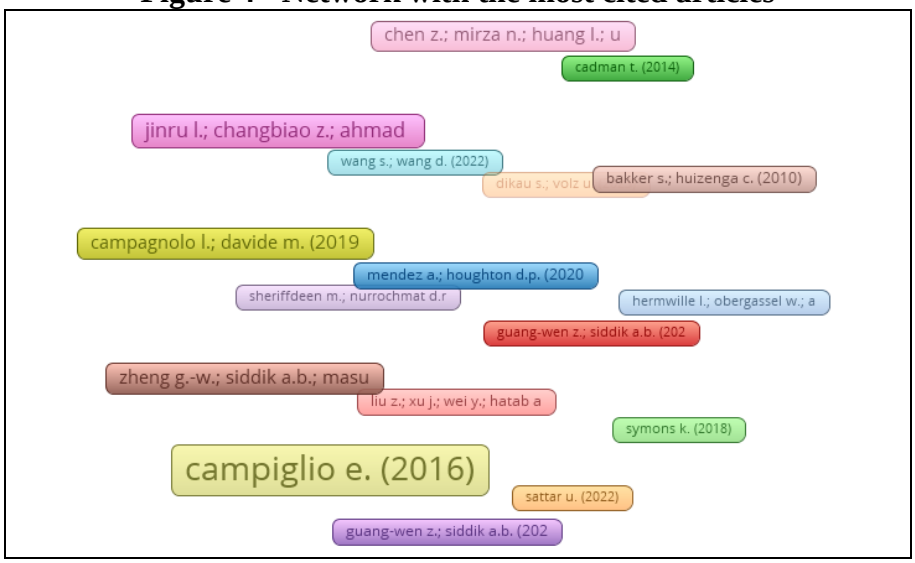
Document Citation Analysis

Document citation analysis is used to evaluate connections between documents through citations received from other works, seeking to understand how a document is influential within a research area, identifying which works reference it, and how these references relate to the context largest scientific literature. The works with the greatest impact in the area under study can be considered as those with the highest number of citations, making it possible to define their strength for advances in scientific knowledge. Figure 4 depicts the network of most cited papers on the topic of green finance instruments in the context of developing countries.

Looking at Figure 4, most articles belong to the period when the theme was on the rise, that is, from 2021 onwards when the number of publications around the world began to grow. However, the most cited paper is from 2016, “Beyond Carbon Pricing: The Role of Banking and Monetary Policy in Financing the Transition to a low-carbon Economy”, with 269 citations, belongs to the Journal Ecological Economics, and it was written by Campiglio (2016). The paper aimed to discuss the potential

role of monetary policies and macroprudential financial regulation, reporting on international climate policy instruments with a focus on carbon credit, to finance the transition to a low-carbon society.

Figure 4 - Network with the most cited articles



Source: Self elaboration.

The authors also reinforce the idea that the transition to a low-carbon society requires a large amount of invested resources, and developing countries are normally unable to finance it with their resources, therefore, it is necessary to access external financing, originating, for example, from three main sources: bank loans, market debt (financing in private capital markets issuing debt instruments such as green bonds) and market equity (private investors interested in obtaining part ownership of the project/company). In this way, they suggest that the research areas of sustainability economics and macroeconomics, which are usually studied separately, need to be developed in connection with the new research agenda of green finance, both from a policy perspective and from an economic theory perspective to achieve a systemic understanding.

Then, the second most cited article, "How do green financing and green logistics affect the circular economy in the pandemic situation: the key mediating role of sustainable production", Jinru *et al*. (2022), with 52 citations in the Journal Economic research-Ekonomska istraživanja. The study was conducted in the context of China's manufacturing industries during the pandemic and aimed to identify the key role of green finance and logistics in the adoption of sustainable production and circular economy, portraying funds for climate action to contribute to low-income economies, resource efficiency and adaptation to climate change.

The authors highlight that sustainable production and the circular economy collaborate with environmental sustainability through green organizational operations, where the need to acquire

resources arises through instruments such as, for example, green financing. They further emphasize that there is a substantial gap between the demand and supply of funds to assist in the acquisition of green raw materials, which are essential to achieving green growth. The research has limitations, suggesting that future researchers consider other sectors and regions, as results may vary due to different cultural, ethical, social, and environmental factors.

The seminal article in the sample also appears in the list, with 16 citations, "Making climate instruments work for sustainable transport in developing countries" from Bakker and Huizenga (2010), which aimed to show the impact of financing instruments in the transport sector, addressing international climate policy instruments to meet long-term climate change mitigation objectives and provide incentives for emissions reductions in developing countries. The authors bring the existing international instruments that support emission reductions in the transport sector in developing countries, which are: the Clean Development Mechanism, the Global Environmental Fund (GEF), and the Clean Technology Fund. However, emission reductions resulting from these mechanisms have been modest, considering the need to achieve reductions established as targets. Overall, they conclude given the relatively limited contribution of climate finance to the overall financing of transport programs and projects, it is important to ensure that the objectives of different climate finance instruments are mutually supportive.

Mapping of green financing instruments and alignment with the SDGS

Following the bibliometric analysis, which provided insights into trends, patterns, and primary research topics, this study shifts its focus to address the central question. This section identifies specific green finance instruments highlighted by the reviewed authors and explores the strategies and approaches of green finance being implemented to align economic endeavors with the SDGs in emerging market contexts.

These instruments are categorized into meaningful groups, including Government financing, Funds, Private/non-state investment, Public-private partnerships, Financial institutions, Capital markets, and Foreign direct investment. This categorization serves as a framework for comprehending the various green finance approaches being utilized across economic and governmental activities. Table 2 summarizes these categories along with their corresponding instruments, offering a comprehensive overview of the green financing strategies emphasized by the authors in this study.

Table 2 - Sources of green financing are explored in the literature

Green Financing Sources	Green financing instruments identified by the corpus	Number of studies	Source
Government funding	Green taxes, green subsidies	1	Shang *et al*. (2023)
	Government subsidies, public financing	1	Liu *et al*. (2023)
	Equity participation, relevant ministries' budgets, local budget revenues, general allocation of grants, and investments by state-owned enterprises (SOEs).	1	Setiawan *et al*. (2021)
Funds	GCF	5	Cadman (2014); Campagnolo and Davide (2019); Passaro *et al*. (2020); Chirisa *et al*. (2021); Sattar (2022)
	GEF	3	Bakker and Huizenga (2010); Rana *et al*. (2022); Liu and Xia (2023)
	Clean Technology Fund (CTF)	2	Bakker and Huizenga (2010); Setiawan *et al*. (2021)
	Green Funds	1	Jinru *et al*. (2022)
	Trust Funds (climate-related issues in multilateral development banks)	1	Michaelowa *et al*. (2020)
	Least Developed Countries Fund (LDCF)	1	Sattar (2022)
	Special Climate Change Fund (SCCF)	1	Sattar (2022)
	Climate Investment Funds (CIFs)	1	Sattar (2022)
	Sustainable and Governance Investment Funds	1	Plattek and Figueiredo (2023)
	Investment Fund for China-Latin America Production Capacity Cooperation (CLAI)	1	Larsen *et al*. (2023)
	Indonesia Climate Change Trust Fund (ICCTF)*	1	Sheriffdeen *et al*. (2020)
	China-Africa Development Fund (CAD)*	1	Larsen *et al*. (2023)
	Silk Road Fund (SRF)*	1	Larsen *et al*. (2023)
	Indonesia Climate Change Trust Fund (ICCTF)*	1	Setiawan *et al*. (2021)
	Indonesia Green Investment Fund (IGIF)*	1	Setiawan *et al*. (2021)
	Zakat Fund *	1	Johan (2022)
Private/non-state investment	Venture capital firms, angel investors, impact investors, peer-to-peer lending, and crowdfunding platforms.	1	Setiawan *et al*. (2021)
Public Private Partnerships	Use public resources and policies to pool funds, with the support of multilateral agencies, donors, and private sources.	1	Setiawan *et al*. (2021)
Financial Institutions	Carbon credit	6	Campiglio (2016); Hermwille *et al*. (2016); Guang-Wen and Siddik (2022); Li *et al*. (2023); Lin *et al*. (2023); Talha (2023)
	Green lending	4	Setiawan *et al*. (2021); Shang *et al*. (2023); Dikau and Volz (2023); Li (2023)
	Green investments	4	Banani and Sunarko (2022); Baiwei *et al*. (2023); Lin *et al*. (2023); Dikau and Volz (2023)
	Green credit	4	Banani and Sunarko (2022); Li *et al*. (2023); Lin *et al*. (2023); Liu *et al*. (2023)
	Mutual Funds	3	Setiawan *et al*. (2021); Mendez and Houghton (2020); Shang *et al*. (2023)
	Green insurance	2	Li *et al*. (2023); Lin *et al*. (2023)
	Sharia Financing *	1	Johan (2022)
Capital Market	Green bonds	12	Mendez and Houghton (2020); Wang and Wang (2022); Shen *et al*. (2022); Argandoña *et al*. (2022); Guang-Wen and Siddik (2022); Plattek and Figueiredo (2023); Li *et al*. (2023); Lin *et al*. (2023); Talha (2023); Dikau and Volz (2023); Li (2023); Setiawan *et al*. (2021).
	Sustainability Bonds	2	Argandoña *et al*. (2022); Liu *et al*. (2023)
	Social Bonds	1	Argandoña *et al*. (2022)
	Climate Awareness Bond	1	Mendez and Houghton (2020)
	Stocks and bonds	1	Setiawan *et al*. (2021)
Foreign Direct Investment	Loans, grants, and joint crediting mechanism	1	Setiawan *et al*. (2021)

Source: Self elaboration.
Note: * Instruments aimed at specific nations.

Through the content analysis carried out and considering the division by existing funding sources, the instruments identified in the sample studies will be presented and discussed in this section, to understand and recognize practices in developing countries and which SDGs can be covered, i.e.: No Poverty (SDG 1), Zero Hunger (SDG 2), Quality Health (SDG 3), Quality Education (SDG 4), Gender Equality (SDG 5), Clean Water and Sanitation (SDG 6), Clean and Affordable Energy (SDG 7), Decent Work and Economic Growth (SDG 8), Industry, Innovation, and Infrastructure (SDG 9), Reducing Inequalities (SDG 10), Sustainable Cities and Communities (SDG 11), Consumption and Responsible Production (SDG 12), Action Against Global Climate Change (SDG 13), Life in Water (SDG 14), Life on Land (SDG 15), Peace, Justice, and Strong Institutions (SDG 16), and Partnerships and Means of Implementation (SDG 17).

Government financing

The Government Financing category was created for financial instruments and strategies adopted by governments to promote sustainable initiatives and projects, such as subsidy programs, tax incentives, low or zero-interest loans, as well as direct government investments in green infrastructure projects and clean technologies.

Government financing plays a crucial role in creating an enabling environment for investment in projects and initiatives that contribute to a more sustainable future and is considered one of the main sources by authors. For instance, Ampri *et al*. (2014), stated that when budget expenditures are aligned with national planning and local implementation priorities, this ensures that budgets are allocated to support, for example, measures, policies, and initiatives aimed at combating climate change and mitigating its effects.

Related to this approach, three articles deal with financing instruments coming from government sources, namely: Green taxes - taxes applied to activities, products, or services that generate a negative environmental impact; Green subsidies – financial incentives offered to support activities, industries, or technologies that have positive environmental benefits; Government subsidies - direct or indirect financial incentives that can take various forms, such as cash, tax reductions, preferential rates, low-cost loans or other financial benefits; Public financing - resources provided by the government or government entities to finance a variety of programs, services and initiatives (LIU *et al*., 2023; SHANG *et al*., 2023). Furthermore, Setiawan *et al*. (2021) cite equity participation, relevant ministries' budgets, local budget revenues, general allocation of grants, and investments by state-owned enterprises (SOEs), which are all government resources directed to investments in practices aimed at achieving the SDGs.

In a more concise view, these instruments include fiscal instruments, applied to polluting activities to discourage behavior harmful to the environment, financial incentives to support sustainable practices, as well as financial resources and direct government investments to support sustainable projects, and other diversified sources with varied methodologies such as resources that are allocated to specific government departments to promote sustainable initiatives, financing from local governments for environmental projects, investments from state-owned companies in green and sustainable projects, among others.

It is important to note that the relationship between green government financing and the SDGs may vary depending on how these instruments are allocated and used in specific projects. In the content analysis carried out, the authors explain that the purpose of these financial instruments is to promote low-carbon development and environmental protection. These financial instruments are strategically targeted to encourage practices and projects that reduce carbon emissions, improve energy efficiency, and protect the environment.

According to our analysis, these initiatives are aligned with SDG 6 through projects that provide improvements in access to clean water and adequate sanitation; SDG 7 at a time when these investments can be used to drive the transition to cleaner and more affordable energy sources. SDG 13 by financing actions that reduce carbon emissions and combat climate change; and SDG 15, with a view to the initiative to protect the environment, in which resources can be allocated to projects that promote biodiversity, the management of protected areas, and the recovery of degraded ecosystems.

Funds

The Funds category refers to specific financial mechanisms created to allocate resources to sustainable development projects and initiatives, which can be established by various entities, such as governments, non-governmental organizations, development banks, or even international entities. The main characteristic of the instruments in this group is to bring together capital from various sources and direct it towards actions that promote environmental, economic, or social sustainability. They play a crucial role in providing financial resources to initiatives that might otherwise lack adequate funding.

In the context of the sample analyzed, 15 of the articles examined refer to at least one financing fund intended for developing countries as an alternative used to finance their projects aimed at sustainability. Thus, a diverse range of financing instruments denominated in this category was identified. These instruments include government funds, international donation funds, and social impact investment funds, among others. Each of these funds is designed to address specific financing needs and

sustainability objectives, contributing to the implementation of practices and projects aligned with the SDGs.

In this category, several financing instruments were found, however, the ones most frequently mentioned in the sample are highlighted below, suggesting greater relevance. Most prominent, present in 5 studies, is the GCF, which is a fund designed to finance climate mitigation and adaptation, supporting developing countries in their multiple challenges (CHIRISA *et al*., 2021).

Next, appearing in 3 studies is the GEF, which provides subsidies to developing countries to address global environmental issues, including climate change (BAKKER; HUIZENGA, 2010). The Clean Technology Fund (CTF) appears in two studies and refers to expanded financing for "transformational actions" that contribute to the demonstration, implementation, and transfer of low-carbon technologies with significant potential for reducing gas emissions. greenhouse effect in the long term, though, for example, grants and concessional loans (BAKKER; HUIZENGA, 2010).

Among the variety of instruments identified, it is worth highlighting that there are some aimed at meeting the needs and challenges of certain geographic regions. This regionalization demonstrates an adapted and sensitive approach to the unique characteristics and demands of each region, seeking to promote sustainability solutions that are effective and relevant to local contexts. For example, the Indonesia Climate Change Trust Fund (ICCTF), a key instrument in Indonesia's climate change architecture, aims to achieve the goals of a low-carbon economy and greater resilience to climate change, thereby supporting the Indonesian government in achieving their mitigation and adaptation goals, through financing the implementation of national and local actions (SHERIFFDEEN *et al*., 2020).

The green financing instruments identified in this analysis demonstrate a wide range of objectives, all aimed at promoting sustainable development and mitigating adverse environmental impacts. The main objectives of these instruments include: financing the transition to a low-carbon society; attracting private funds for sustainable investments; green financing projects; mitigating the harmful impacts of business activities on atmospheric quality, natural resources, and the health of living beings; promoting green transitions of companies to achieve environmental protection; support the green recovery; develop financial products with the potential to help resolve socioeconomic issues, such as increasing social inclusion and poverty reduction; reduce energy use and carbon emissions; invest in clean energy projects and promote energy efficiency; reduce environmental pollution and improve green policies, preserving natural resources and reducing hazardous waste; expand credit for sustainable activities and restrict loans to the most polluting sectors.

Thus, they aim to contribute to sustainable development in the long term, optimizing resource allocation, mitigating environmental pollution, and slowing climate warming, aligning with several

SDGs, among which these instruments seek to support SDG 1 by addressing socioeconomic issues, such as increasing social inclusion and poverty reduction; SDG 6 to environmental protection, through sustainable water and waste management projects; SDG 7 which aims to guarantee universal access to clean energy and promote energy efficiency; SDG 9 with investments in sustainable infrastructure and clean technologies; SDG 11 investing in sustainable urban infrastructure; SDG 13, which seeks to combat climate change and its impacts; and SDG 15 through investments aimed at biodiversity conservation and sustainable land use projects.

Private/non-state investment

The Private/non-state investment category was created to comprise instruments that involve non-governmental actors, such as private companies and non-governmental organizations (NGOs), which aim to promote environmental and socioeconomic sustainability, encouraging the private sector to direct its investments to activities that contribute to advancing the SDGs.

There is 1 (one) article in this category. The study conducted by Setiawan *et al*. (2021), carried out in Indonesia, cites instruments such as venture capital firms, angel investors, impact investors, peer-to-peer lending, and crowdfunding platforms. These financing mechanisms involve private and non-governmental actors and are intended to channel financial resources towards sustainable initiatives in the Indonesian context.

The focus of the referred study lies in understanding the effectiveness of these instruments in mobilizing private investments and reports the contribution of low-carbon development, relating mainly to SDG 13, which aims to take urgent measures to combat climate change and its impacts. Furthermore, SDG 7 can also demonstrate a relationship, given that the transition to clean energy sources is a fundamental part of reducing carbon emissions and low-carbon development.

Public-private partnership

The Public-Private Partnership category was used to involve instruments for strategic collaboration between the public sector and the private sector to mobilize financial resources and specialized knowledge to support sustainable projects and initiatives. These partnerships can cover a variety of sectors and demonstrate relevance in the effective implementation of projects aimed at sustainable development, as they combine the resources and expertise of both sectors.

Content analysis reveals the presence of only 1 (one) study in this category. Research conducted by Setiawan *et al*. (2021), carried out in Indonesia, explores the use of public resources and policies to pool funds, with the support of multilateral agencies, donors, and private sources. This focus reflects the crucial role of partnerships between the public sector and the private sector, together with the support of multilateral agencies and donors, in mobilizing financial resources for initiatives that aim to contribute to low-carbon development.

This partnership seeks to align the interests of diverse stakeholders to achieve common sustainability goals and contribute to the SDGs, particularly SDG 7, where investments in clean and affordable energy often require collaboration between public and private entities to promote access to energy sources. sustainable; SDG 9, with the public-private partnership being fundamental to developing sustainable infrastructure and promoting innovation, crucial aspects for economic development and sustainability; and SDG 13, in which partnerships play a central role in mobilizing resources for initiatives that combat climate change, including the transition to clean energy sources.

Financial institutions

The Financial Institutions category aims to encompass various financing instruments that are intermediated by financial institutions, such as banks and credit organizations, essential for financing sustainable projects and initiatives related to sustainable development in developing countries.

Financial institutions are sources for financing sustainable projects and can be divided into two financial sectors, namely banks (e.g., green lending) and non-banks (e.g. insurance companies, mutual funds, and other financial services institutions) (SETIAWAN *et al*., 2021). The authors also comment that the government has a fundamental role in empowering institutions, especially state banks, so that they can offer to finance low-carbon projects, leverage capital from private banks, and provide credit guarantees.

According to the analysis carried out, a total of 17 articles mentioned at least one financing instrument related to financial institutions as part of their research. These instruments cover a wide range of financial options aimed at sustainable development, including green lending, mutual funds, green investments, green credit, green insurance, and carbon credit. The variety of these instruments highlights the diversity of financial approaches and strategies used to drive sustainable projects and initiatives in developing countries.

Carbon credit was the most cited instrument, it is a market for buying and selling carbon credits aimed at reducing emissions (GUANG-WEN; SIDDIK, 2022). Subsequently, green lending appears in 4

studies each, a type of loan that covers renewable energy, sustainable agriculture, ecotourism and green industry (SETIAWAN *et al*., 2021); green investments, which are investments made in projects, companies or assets that allow positive benefits to ensure long-term sustainable development, with the optimization of resources, the mitigation of environmental pollution and the reduction of climate warming (LIN *et al*., 2023); and Green Credit, which comprises a collection of policies and institutional structures that leverage credit to incentivize companies to engage in energy conservation and reduce their carbon footprint (LI *et al*., 2023).

Green mutual funds are mentioned in 3 surveys. These are investment funds that bring together resources from several people for sustainable investments, that is, their main purpose is to attract private funds for sustainable investments (WEBER; FELTMATE, 2016). Green insurance is mentioned in two studies, however, in a very superficial way, without reporting details of its characteristics. In June 2022, the "Green Finance Guidelines for Banking and Insurance" were released, which requires banks and financial institutions to define Key Performance Indicators (KPIs) on green finance and rebuild green finance processes to help their customers achieve green transformation (SHEN *et al*., 2022).

In the analysis carried out, a specific financing instrument was identified for a region, based on its own needs, called "Sharia Financing" mentioned in the article by Johan (2022). It is configured as a financing system and has a particularity, it operates following the principles of Islamic law, also known as Sharia, including the prohibition of paying or receiving interest and the promotion of investments based on Islamic ethical principles, which emphasize sharing risks and rewards in investments. It is worth noting that it is not financing with an explicit environmental focus, but it can be used to finance projects and activities that align with these values.

Papers in this category mention a wide range of contributions in the context of sustainable development. These contributions include financing the transition to a low-carbon society, attracting private funds for sustainable investments, and green financing projects. Furthermore, these instruments aim to mitigate the harmful impacts of business activities on atmospheric quality, natural resources, and the health of living beings, promote green transitions in companies to ensure environmental protection, and support green recovery. They also offer financial products with the potential to address socioeconomic issues such as increasing social inclusion and reducing poverty, reducing energy use, promoting organizational environmental sustainability, and supporting long-term sustainable development by optimizing resource allocation, mitigating environmental pollution, and slowing global warming. They also present that these instruments finance sustainable projects and renewable energy, promoting pro-environmental initiatives, such as clean energy and technology to improve environmental performance.

These contributions are essential to advance the achievement of the SDGs, covering several targets and key areas of these objectives. Thus, SDG 3 can be mentioned, due to the reduction of the harmful impacts of business activities on atmospheric quality, natural resources, and the health of living beings; SDG 7, in which financing instruments contribute to the development of clean energy and energy efficiency projects, promoting access to cleaner and more affordable energy sources; SDG 9, by supporting investments in sustainable infrastructure, innovation and green technologies, promoting the development of more efficient and sustainable infrastructure; SDG 11, as financing can support sustainable urban infrastructure projects, contributing to more sustainable communities; SDG 12 when reporting on the promotion of organizational environmental sustainability and the reduction of energy use and carbon emissions; and SDG 13, as financing instruments play a crucial role in mitigating climate change, financing low-carbon projects and promoting actions to reduce carbon emissions.

Each of these instruments plays a specific role in mobilizing resources for areas such as clean energy, environmental conservation, and climate change mitigation, thus contributing to achieving the SDGs.

Capital market

The Capital Markets category aims to encompass a set of investment instruments and mechanisms related to sustainable development, which involve the participation of investors, financial institutions, and companies in financial markets. These markets may include the purchase and sale of green bonds, shares in sustainable companies, and investments in renewable energy projects, among others. Capital markets have an important role to play as a source of long-term financing for green investments (VOLZ, 2015).

The analyzed sample encompasses a set of 13 articles that address different financial instruments related to the promotion of sustainable practices and the mobilization of resources destined for environmental and social issues. These instruments differ about their purpose, which can be environmental, climate, or social. Green bonds are mentioned in all studies and correspond to debt securities issued with the specific purpose of financing projects or actions that have positive environmental impacts, which may include, for example, initiatives related to the promotion of clean energy, energy efficiency, and transport. sustainable, among others. On the other hand, Climate Awareness Bonds, mentioned in the study by Mendez and Houghton (2020), have similarities with green bonds, however, they have a more specific focus on climate issues, aiming to finance projects and actions aimed at mitigating climate change and adaptation. to its effects.

Another instrument identified is social bonds, reported in the study by Argandoña *et al*. (2022), which are bonds issued to finance projects and programs that promote positive social impacts, which may encompass areas such as health, education, affordable housing, and employment. Finally, sustainability titles, cited in research by Argandoña *et al*. (2022) and Liu *et al*. (2023), represent a broader category, covering both environmental and social aspects, and can be targeted to finance a wide variety of sustainable projects.

According to studies, these instruments aim to attract private resources for sustainable investments, boosting the development of a low-carbon economy and promoting sustainable practices. They support the transition of companies and projects to a greener approach, reducing energy use, and carbon emissions and promoting energy efficiency. Furthermore, they contribute to climate and environmental projects, pollution prevention, sustainable agriculture, fishing, and forestry, as well as the protection of biodiversity and water quality. These instruments cover a variety of activities and have a positive impact in areas beyond renewable energy, seeking a broader range of sustainable practices that promote long-term sustainable development, mitigating environmental pollution, and combating climate change.

It is observed, then, that these instruments aim to cover a wide range of initiatives to promote environmental protection and sustainability, including areas such as clean water, recycling, biodiversity, pollution control, and proactivity, going beyond renewable energy and energy efficiency. In this way, they play a fundamental role in promoting sustainable development, and addressing various environmental and social challenges aligned with the SDGs.

About SDG 7, they present contributions to the promotion of clean and sustainable energy sources, such as renewable energy and energy efficiency, to SDG 9, they can support the development of sustainable infrastructure and technological innovations aimed at sustainability. It can be related to SDG 13 in terms of contributions to mitigating climate change, and reducing carbon emissions, to SDG 14, the promotion of sustainable practices that can benefit marine ecosystems and aquatic life, and SDG 15 with contributions to the conservation of biodiversity and the protection of terrestrial ecosystems.

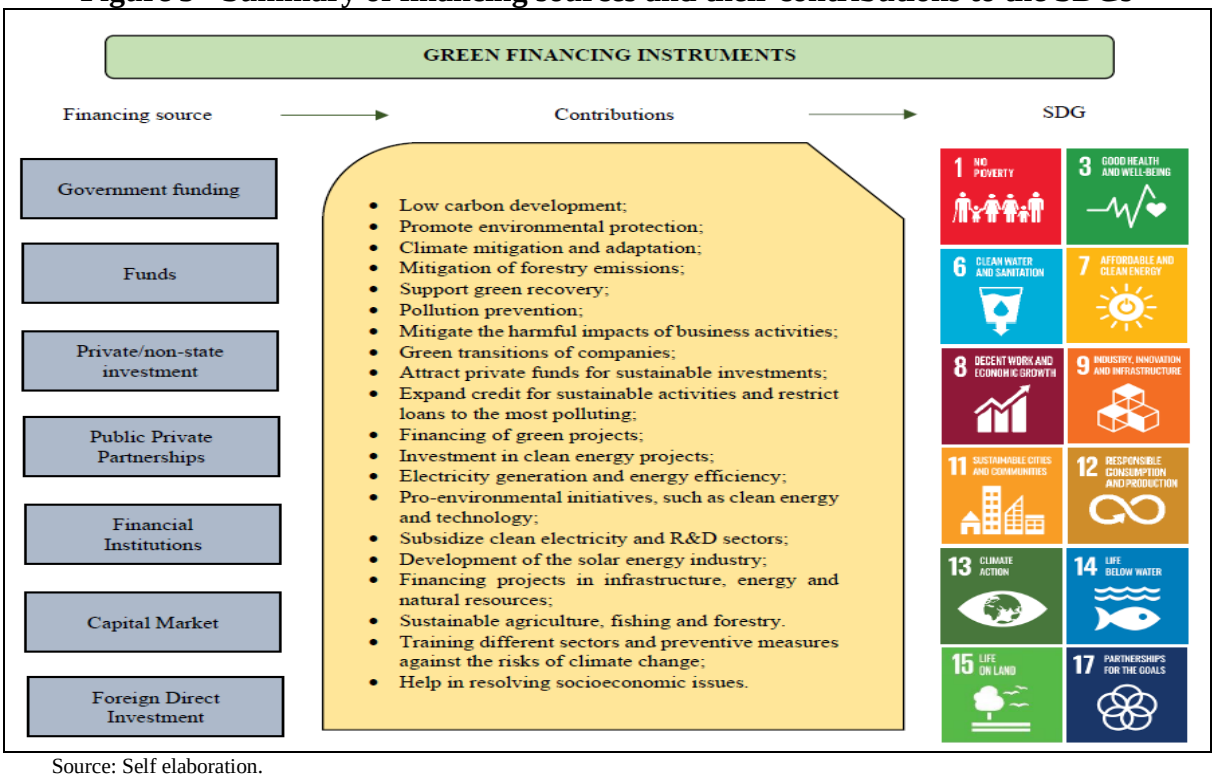
Foreign direct investment

This category was created to cover capital flows originating from one foreign economy and destined for another, whether to establish, expand or maintaining a lasting presence in a company or organization in the receiving country, aiming to complement available local resources.

The analysis identified a single study with this approach, conducted by Setiawan *et al*. (2021) and carried out in Indonesia, where international development partners add significant resources to the country. The study highlights instruments such as loans, grants, and joint credit mechanisms, which can be used to mobilize foreign capital and support sustainable development projects. The authors also report that in Indonesia this is an important source of financing and aims to mitigate the effects of climate change, through low-carbon projects, such as investments in clean technology, obtaining potential to boost low-carbon development. and the mitigation of environmental impacts, aligning with the SDGs.

Depending on the type of project and the policies applied in the specific context, foreign investments can have impacts on different SDGs. However, based on the information narrated by the case study, it can be mentioned the existence of a relationship with SDG 7, in which direct foreign investment can be directed to clean and renewable energy projects, contributing to the generation of sustainable energy. and accessible; SDG 9, at a time when investments can boost the development of sustainable infrastructure and innovative technologies, promoting inclusive economic growth; and SDG 13, as an investment, can be a crucial source of financing for climate change mitigation and adaptation projects, helping to combat global warming.

Figure 5 - Summary of financing sources and their contributions to the SDGs



Source: Self elaboration.

Figure 5 offers a visual synthesis of the green financing sources explored in this study, their contributions highlighted in the research analyzed, and their connection to the SDGs. This simplified representation helps illustrate how different funding sources are linked to specific contributions to sustainability and how these contributions align with the SDGs.

The results of this analysis revealed that the green financing instruments explored in the studies contribute substantially to twelve of the seventeen SDGs. SDG 7 and SDG 13 emerged prominently, present in all categories, demonstrating that these instruments have been mobilized mainly to meet these climate SDGs, related to the mitigation of climate change and the promotion of clean energy sources. Furthermore, SDG 9, which involves sustainable innovation and infrastructure, was frequently mentioned, highlighting the need for sustainable technological and economic development. However, this paper did not seek to identify the actual use of these mechanisms in achieving the SDGs for developing countries.

The analysis of the contributions and implications of these instruments, about the achievement of the SDGs, provides fundamental insights to guide policies, business practices, and investment strategies aimed at comprehensive and effective sustainable development.

CONCLUSIONS

This research aimed to investigate international scientific production on green finance, specifically focusing on developing countries, and identifying financial instruments used or that can be utilized to achieve the SDGs through a systematic literature review and bibliometrics.

The evolution of scientific knowledge production in the context explored by this research demonstrated a gradual growth. Although research has been ongoing since 2010, it wasn't until 2022 that the number of publications significantly increased, a trend continuing into 2023. Even considering that the sample was collected midway through 2023, the volume of studies had already surpassed the combined total of all publications from previous years.

The bibliometric analysis enabled the visualization of networks and highlighted areas within the sample studies. These works cover topics including renewable energy, energy efficiency, green financial institutions/banks, ecological financing, factors influencing green financial restrictions, and initiatives related to low carbon and monetary policies aimed at improving sustainable financing and mitigating the effects of climate change and its associated risks. The concentration of research in these areas underscores the interest attributed to these topics in the context of sustainable finance.

The content analysis aided in identifying the financial instruments portrayed in the literature, categorized to facilitate investigation into Government financing, Funds, Private/non-state investment, Public-private partnership, Financial Institutions, Capital markets, and Direct foreign investment. Each category plays a crucial role in mobilizing financial resources to support sustainable practices and actions aimed at environmental protection and achieving the SDGs. These instruments range from direct government financing to green bonds, multilateral funds, private investments in sustainable projects, and public-private partnerships, each with its relevance and purpose.

The analysis revealed that these green finance instruments could play an important role in promoting sustainable practices, mitigating climate change, protecting biodiversity, reducing pollution, and promoting social inclusion, demonstrating how green finance is related to a variety of aspects involving sustainability. However, the sample in question revealed that, although green financing can be directed to different modalities within sustainability, most of the research portrays the instruments with the intention of climate mitigation and adaptation, whether through the reduction of carbon emissions, investment in green technologies and renewable energy, among others.

Given the sample, some instruments were more prominent. Among these instruments, funds played a notable role, emerging in several studies as key mechanisms for providing financial resources to these nations. This highlight may suggest the critical relevance of these funds in emerging economies and point to their importance in promoting sustainability. Another group that gained prominence was the capital market, through green bonds, which were consistently mentioned in the literature analyzed. The prevalence of this instrument may indicate its growing importance as a source of sustainable financing for projects and initiatives in these countries. Furthermore, this observation may also point to the need for deeper investigation into how these green bonds are being implemented and their real impact on the sustainable development goals of emerging countries.

The financial institutions category also stood out, present through facilitating instruments for green financing, offering a variety of products and services that aim to direct financial resources to environmentally responsible and socially beneficial projects. It is worth highlighting the importance of these institutions not only in allocating resources but also in guiding financial policies and practices towards sustainability, suggesting a field of research in constant evolution. Thus, the relevance of exploring more deeply how these entities are contributing to sustainable development in emerging countries and how their practices and strategies can be improved to address the specific environmental and social challenges of these regions is highlighted.

The results of this review showed that 12 of the 17 SDGs can be financed through green finance instruments. Although the other objectives do not appear directly in research, these SDGs can also be

influenced or supported by green financing, green financing can be directed towards sustainable agricultural practices, promoting food security and agricultural systems that are more resilient to climate change (SDG 2); investments can be used to improve educational infrastructure, providing more energy-efficient and accessible schools, contributing to quality education (SDG 4); Programs that promote gender equality can be supported by green finance, especially in sectors such as wind and solar energy, where female representation is traditionally lower (SDG 5); green finance initiatives can contribute to reducing inequalities by providing employment and economic development opportunities in disadvantaged communities (SDG 10); and promoting sustainable and ethical business practices through green finance can contribute to building fairer societies and more effective institutions (SDG 16).

The conclusions drawn from this paper hold significant theoretical implications for sustainable finance and practices, particularly in shaping collaborative discussions and defining public policies. The insights gained provide valuable guidance for future research endeavors on green finance's role in fostering sustainability. Overall, amidst the urgent global need for sustainable development, this study furnishes a foundational framework to inform policy decisions and scholarly inquiries, thereby contributing to the collective endeavor of achieving the SDGs.

However, the research is not without limitations. The reliance on publicly accessible data may have led to the omission of certain contexts and financing instruments, as many relevant studies and reports may reside in restricted databases. Additionally, while the study focused on developing countries in general, the diverse political, economic, and cultural conditions across these nations pose challenges in applying conclusions universally. Furthermore, while the sample was carefully curated to include papers mentioning green financing instruments for these nations, not all articles confirmed the effective implementation of these instruments, and the analysis was primarily descriptive in nature.

The increasing volume of published research underscores the growing importance of this field in advancing the SDGs agenda. However, given the predominant focus on climate change, there is a pressing need to encourage a more comprehensive approach that addresses all SDGs. Future research endeavors could delve into the application of sustainable financing instruments across various contexts and regions, considering the unique challenges encountered by developing countries. Additionally, there is a call for studies to evaluate the long-term impact of these instruments and analyze their potential to foster social inclusion, biodiversity protection, and pollution reduction. As the field continues to evolve, it is imperative to explore innovative approaches and effective implementation strategies that can expedite progress towards the SDGs, ensuring no goal is left behind. In doing so, this paper seeks to contribute to ongoing discussions and provide guidance for future studies, considering the resilience and vulnerability of developing countries, thereby facilitating advancements in the pursuit of sustainability.

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Ano VI | Volume 17 | Nº 50 | Boa Vista |2024

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