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# Enhancing Green Finance for Inclusive Green Growth: A Systematic Approach

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**Abstract:** Recently, green financing has become a popular technique for dealing with environmental issues. However, whether green financing is effective in addressing current global environmental issues remains to be seen since the green investment gap has been discovered to be rather sizable, with no certainty regarding how to fill it. The purpose of this study was to systematically analyze green finance in all of its forms, instruments, and measurements. Herein, we highlighted overall research trends in an effort to enhance green finance for inclusive green investment, as well as examined the progress needed to fill the green finance gap. This study also provides information on which authors, countries, publishers, and journals are contributing most to green finance. The methodological approach used in many reviewed papers was determined as a benchmark for those authors interested in green finance. Moreover, this study critically analyzes and summarizes 146 relevant studies. The results of our review study imply that the green financing gap is frequently observed because of low finance levels, poor green project selection/management, risk and return trade-off, and a lack of analytical tools and expertise in identifying and assessing green project risks. More specifically, regulatory issues have been observed as the main challenge in enhancing green finance. Therefore, we propose further studies to be conducted on how to enhance green finance for green investment that could deliberately affect green growth. Simultaneously, we noted what incentives could initiate private investors to make green investments, and what additional green financing methods should be introduced to fill the financing gap. Finally, this study seeks to have an impact in assisting future studies to consider the status of each country in terms of green finance mobilization and capital contribution by sharing the specific experience of that country and what lessons could be learned from that country.

**Keywords:** green finance; green growth; enhancing green finance; a systematic approach



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## 1. Introduction

Following the announcement of the new Sustainable Development Goals (SDGs) in March 2016, many countries began to implement new development strategies centered on inclusive green growth [1], which was coined in an attempt to unite the world's interest in both green and inclusive growth. The concept of inclusive green growth can be explained in different ways [2]. However, the overall objective of inclusive green growth can be summarized as economic growth that results in wider access to sustainable socioeconomic opportunities for a broader number of people, regions, or countries, while protecting the vulnerable, all being done in an environment of fairness, equal justice, and political plurality [1]. Promoting inclusive green growth is a critical tool for achieving sustainable development goals by taking into account the three pillars of sustainable development: economic, environmental, and social sustainability. Yet we cannot assume that green growth is inherently inclusive as it is difficult to maximize the benefit for and minimize the cost to poor communities, who are vulnerable to damaging environmental causes [3].

Poor communities are expected to use natural resources for survival without any environmental consideration [4]. The ongoing loss of nature has become a systemic risk for the global economy; the New Nature Economy report found over half of the world's GDP depends on nature [5]. As evidence, 12 million hectors of land have been degraded due to its unsustainable use every year, and three-quarters of the land and two-thirds of the marine environment has been significantly altered by human actions. In this case, green growth should focus on what needs to be done in the future to avoid being locked into unsustainable paths and to generate immediate local benefits. Therefore, it is suggested that green growth policies must be carefully designed to minimize policies and actions that have irreversible negative impacts.

Among the structural barriers and systemic rigidities that hamper this transition, one of the most important techniques for unlocking sustainable paths is generating green finance, which can promote green growth [5]. These facts are the practical challenges that require a huge amount of financing for sustainability.

Green finance is the way to increase the level of financial flows (banking, micro-credit, insurance, and investment) from the public, private, and not-for-profit sectors to promote sustainable development priorities [6]. As such, green finance is instrumental in achieving the objective of sustainable development goals that consider green growth. Hence, inclusive green growth can be achieved through inclusive green finance, as inclusive green finance helps to mitigate and build resilience against the negative impacts of climate change. Under the concept of the inclusive green finance remit, financial institutions are mandated to provide those finances vital support to those navigating an uncertain environment by promoting green products within savings, credit, insurance, money transfers, and new digital delivery channels. Resultingly, the overall investment strategy should be shifted to green, as it plays a key role in enabling the implementation of the UN Sustainable Development Goals (SDGs), particularly SDG 1 (no poverty), SDG 7 (affordable and clean energy), and SDG 13 (climate action), all of which deliberately enhance green growth.

Green investment in different sectors has grown at a fast pace in recent years [7], particularly investment in green buildings, clean energy, renewable energy, and production capacities. However, a large financial gap still exists to de-carbonize the economy [8].

A recent 2021 report published by the United Nations Environment Program [5] shows that if the world is to meet targets for climate change, biodiversity, and land degradation, it needs to close a USD 4.1 trillion financing gap by 2050. The current investments in nature-based solutions amount to USD 133 billion, most of which comes from public sources. This study calls for investments in nature-based solutions to triple by 2030 and to increase four-fold by 2050 from the current level. Furthermore, this study highlights the need for a significant increase in private sector investment in nature-based solutions. From this aspect, the green investment gap was found to be very wide and no certainty exists regarding how to fill it [9]. Apart from that, it has also been observed that there are emerging disappointments among those who are making a green investment as the result of a shortage of green finance [10].

There are many arguments regarding factors that prevent economic resources from flowing in larger amounts to green investments. The first argument is the miserable macroeconomic environment. After the financial crisis of 2007, the global economic system in high-income countries [11] suffered from a difficult period of economic activity that led to a recession and high levels of unemployment [12]. This created low investment levels in the economy and prevented a lack of confidence among economic agents [8].

The second and critical factor is the nature of green investments regarding risk and returns trade-off. In this case, the perception of risks related to technology evolution and market development is the concern of green investors [4]. Many government authorities do not support financing the green sector, as it stresses economic crisis [13]. Therefore, a large green finance gap occurs in light of the expected risk-return trade-off, and, thus, returns on green investments should be very high to attract investors [14]. There is, however, little compensation considered by some countries for those investors who plan to make a

green investment [9]. This could have been considered another factor that hinders private investors from not making the required participation in green investments. Regarding the issue, some studies have been conducted on the general opportunities and challenges of green financing and provide helpful recommendations on a way to fill the green finance gap [7,9,15–19]. However, the green finance gap has increased from year to year, and no better way has yet to be determined to fill the current and future green finance gap. As a result, the current study attempts to review previously conducted studies and identify the key players in enhancing green finance. At the same time, it suggests future research that seeks to fill the green financing gap. It could also help with the tasks that each stakeholder in green financing enhancement is required to fulfill.

## 2. Methodology

For this specific systematic review, we developed a search strategy to identify relevant literature on the specific study. This search strategy was mainly used from two databases (Scopus and Web of sciences) with a search term of "green finance." However, the term "green financing" is defined in different ways by different scholars. The scope and content of the definitions, on the other hand, are similar [20]. Because of the breadth of the terminologies used in green finance, we narrowed them down to green financing, carbon finance, green fund, green credit, and climate financing based on the contents of the papers and their usefulness. We thus identified the best-related scope of green finance for our review. We extracted the resource using the following keywords from the databases: All = ("green finance" OR "green financing") AND ("climate" OR "climate finance" OR "carbon finance") AND ("green bond" OR "green credit" OR "green fund"). The search mainly focused on mapping existing literature on green finance in the field of business and economics, social sciences, environmental sciences, and other multidisciplinary fields. The following Table 1 of the study shows the scope of green finance that we considered during the systematic review.

**Table 1.** Scope of green finance.

| | | |
|---|---|---|
| Carbon finance | Defined as financial policies that increase investments and financing for the development of low-carbon projects, as well as other financial intermediary activities. | [21] |
| Green fund | Debt and equity financing that provides clients with platforms for long-term funding of environmentally friendly businesses and organizations. | [22] |
| Green credit | Project loans (mainly mortgage) and industrial loans can be facilitated through the green deposit. | [23] |
| Green bond | Proceeds solely used to finance or refinance projects with obvious environmental benefits. | [24] |
| Climate finance | In general, financing promotes the climate resilience of infrastructure, as well as social and economic assets. | [25] |

We identified the best-related scope of green financing for our review. We extracted the resource using keywords from the WOS and Scopus databases. The databases chosen have been used in similar reviews [26]. Using both databases at the same time did result in the duplication of a single document. Because both databases feature high-quality journals, the majority of journals are registered with both databases, and a single document is available on both databases at the same time, resulting in document duplication and adding a task to academic writers for document sorting. To address the duplication issue, we merged both documents extracted from the databases in a Microsoft Excel spreadsheet. We established criteria for including and excluding articles for review. In doing so, we used various search mechanisms to manage and identify the most important and relevant studies. Initially, we established a period for published studies. All searches from 2015 to 2022 were included

and others were excluded. This period was selected to see the response of academic writers to green finance in the wake of the 2015 Paris Agreement. Secondly, we only included studies written in the English language. Finally, we only included documents presented as articles and reviews in proceeding journals; we excluded other types of documents and articles in the press. The selection criteria were based on the PRISMA statement [27].

Our search mainly focused on the mapping of existing literature on green finance in the field of business and economics, social sciences, environmental sciences, and other multidisciplinary fields. Using our systematic review approach, we were able to evaluate the progress in a given research field and develop new studies based on that progress [28]. We excluded articles that did not meet the inclusion criteria. Finally, 727 studies were discovered through Scopus (526 studies) and the web of sciences (201 studies). Of the identified 727 studies (after fixing the duplication and screening issues), 146 relevant studies were acknowledged for the systematic review. Regarding the sample size, there is no minimum sample size requirement for systematic reviews [29]. Therefore, the current study's sample size of 146 studies is adequate. The flowchart shown in Figure 1 provides details on the search results.

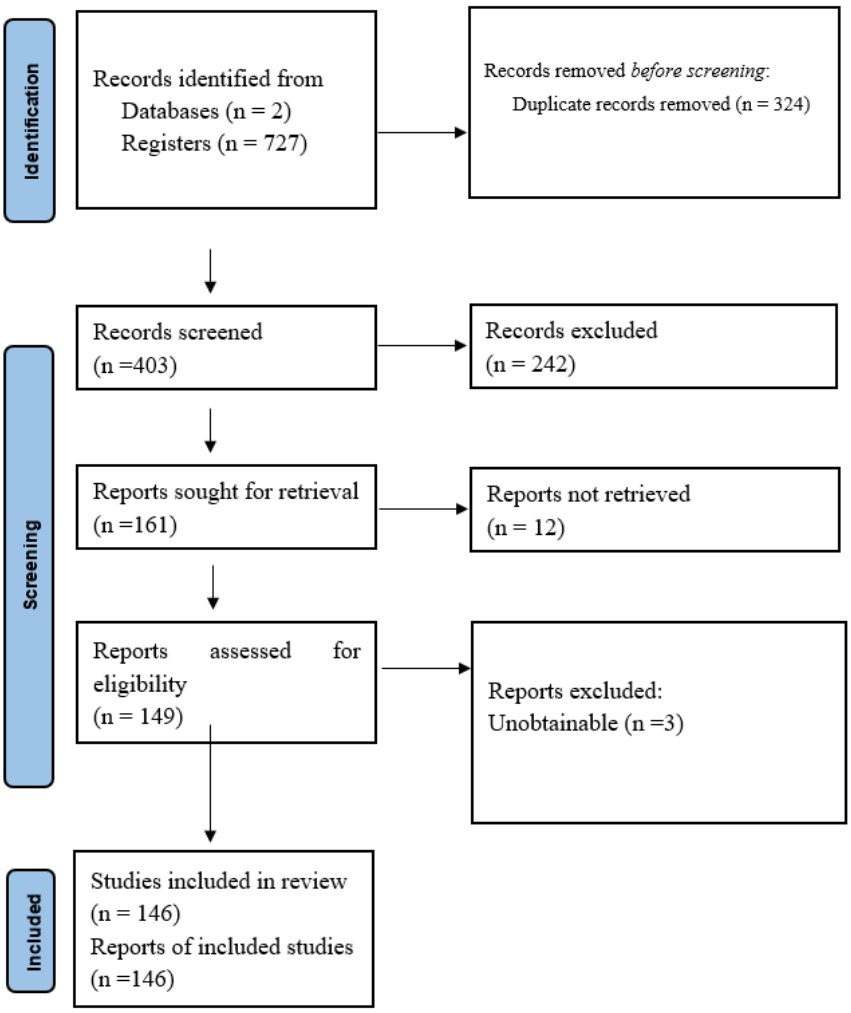


**Figure 1.** Study selection process flowchart.

Each study's data was extracted and entered into a Covidence review software system and a Microsoft Excel spreadsheet. In doing so, the year of publication of the paper, the authors' names, the titles of the article, the keywords, and the abstract of the study were all extracted. The Zotero reference managers were used to ensure that citations and documents were properly accounted for throughout the process with VOS-viewer software.

## 3. Result and Interpretations

The review was shaped by gathering resources from the two databases. After all criteria were met, 146 studies were used for the final discussion. The following section discusses the descriptive analysis of the study.

### *3.1. Publication Trends*

From 2015 to 2022, studies on green finance were used to sample the study period. Because the study area has grown in popularity since the 2015 Paris Agreement [30], the findings (Figure 2) showed an increase in the number of publications on green finance research, indicating that the research area is receiving increasing scholarly attention, as evidenced by the consistent increase in publication numbers. According to our review, there has been a significant increase in the number of publications. In 2016, one paper was found; in 2021, 64 papers were found. This shows that green finance is still at the heart of current research areas in different multidisciplinary fields. Even at the time of this study's publication in 2022, 16 new articles have been published and are available to readers.

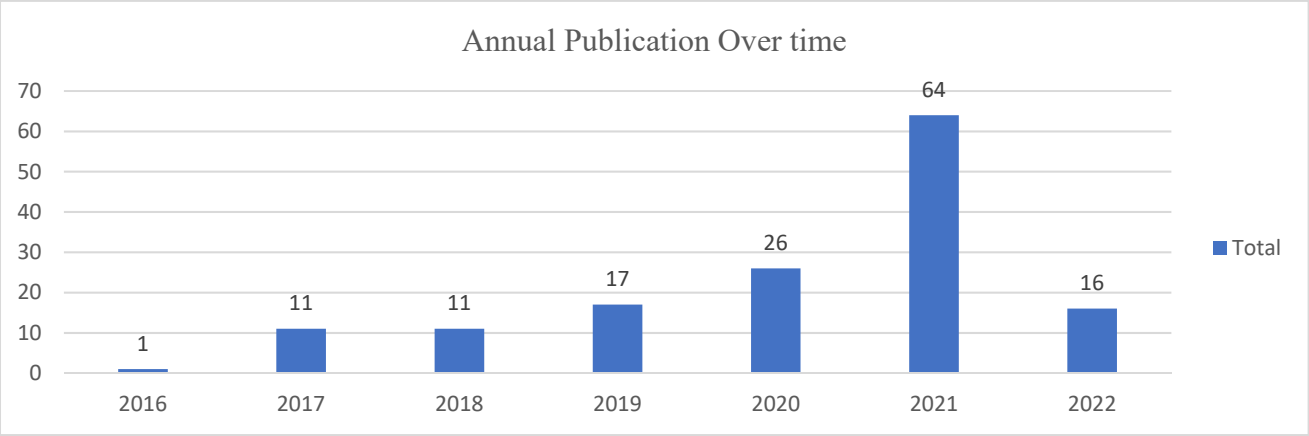


**Figure 2.** Trends in annual publication over time.

### *3.2. Frequency of Documents Used in the Study*

As shown in Figure 3, the majority of resources used in this study were articles from journals, accounting for 82% of the total. Proceeding papers were the second most common documents used and, lastly, 2% of the document were review papers. It could help the study to have a larger number of research articles to investigate methodological and theoretical aspects of the study interest.

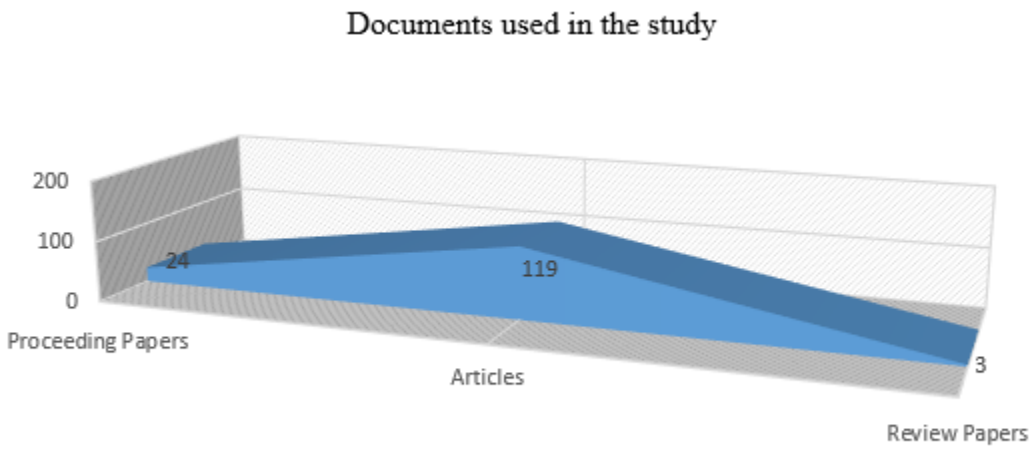


**Figure 3.** Frequency distribution of material used in the study.

### *3.3. Citation Analysis*

Citation analysis is a method of determining an author's, article's, or publication's relative importance or impact by counting the number of times that author, article, or publication has been cited by other works. It is primarily useful in determining the impact of a particular work by identifying which other authors base their work on it or cite it. Furthermore, identifying seminal works in a field or topic can aid in learning more about that field or topic. To determine the impact of a specific author or title on green finance, we used citation analysis for both articles and titles. The following (Table 2, and Figure 4) shows how many times specific titles and authors were cited in the field of green finance.

**Table 2.** Citation analysis by title name, and authors.

| Article Title | Authors | Cited Times |
|---|---|---|
| The way to induce private participation in green finance and investment | [31] | 129 |
| A bibliometric analysis on green finance: Current status, development, and future directions | [15] | 89 |
| Sustainable Solutions for Green Financing and Investment in Renewable Energy Projects | [32] | 66 |
| Can green financial development promote renewable energy investment efficiency? A consideration of bank credit | [33] | 60 |
| Nexus between green finance and climate change mitigation in N-11 and BRICS countries: empirical estimation through difference in differences (DID) approach | [16] | 53 |
| The Impact of Green Lending on Credit Risk in China | [34] | 51 |
| Greening of the financial system and fueling a sustainability transition A discursive approach to assess landscape pressures on the Italian financial system | [35] | 50 |
| Modeling the social funding and spill-over tax for addressing the green energy financing gap | [36] | 49 |
| Bridging funding gaps for climate and sustainable development: Pitfalls, progress, and potential of private finance | [37] | 48 |
| From sustainability accounting to a green financing system: Institutional legitimacy and market heterogeneity in a global financial Centre. | [38] | 47 |

We then extracted the top 10 most cited articles on green finance from the two databases. According to our findings, 129 studies cited an article titled "How to Induce Private Participation in Green Finance and Investment." This result supports the rationale of the current study because there is a sizable gap in green finance for green investment, and the participation of private investors is less compared to others [7]. At the same time, many scholars are attempting to come up with a new finding for enhancing green finance and to increase private investment participation [39]. We are also interested in creating a map using the VOS-viewer software to see the connections between academic writers and who is contributing the most to the field of green finance. The authors [15,31,32] were the most cited because they contributed more studies to the field of green finance. Furthermore, the following Figure 4 showed the network of authors those most cited.

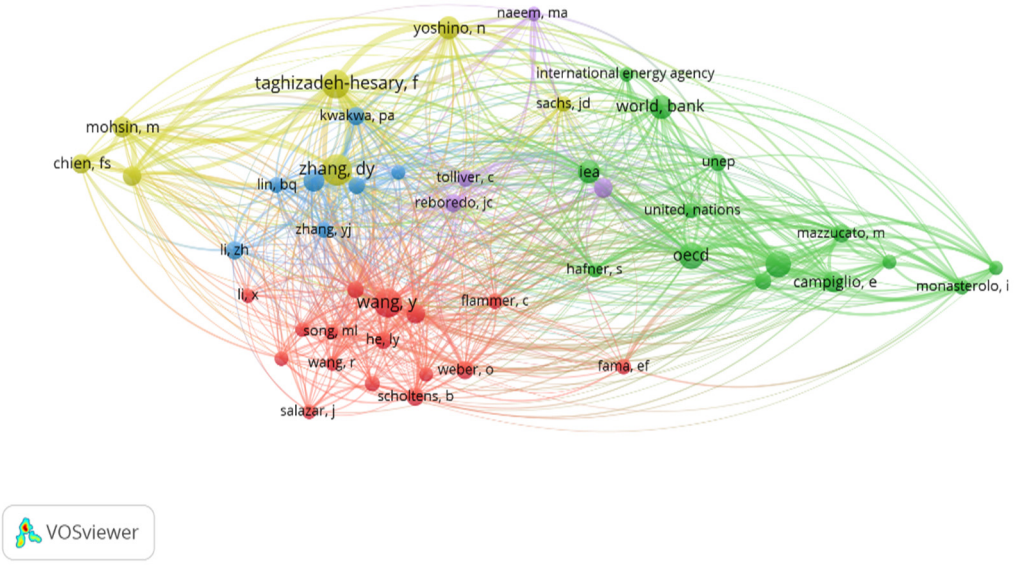


**Figure 4.** Mapping of most cited Authors.

Figure 4 of the study showed the map of authors mostly cited in the study area. The total documents used in this study are classified in to five clusters with different colors (green, red, blue, yellow, and pink). Classification are made based on grouping mostly cited authors among the documents used in this study. Those authors with highest citations are found the leader of each cluster as the majority of the networking lines are linked to them.

### *3.4. Most Research Areas Contribute to Green Finance Publication*

The 146 research papers examined in this study were published by 45 different publishers and 88 different journals. We chose the top 10 publishers and journals that published relevant articles (Figure 5). MDPI of Switzerland is the leading publisher, having published 24 articles on green finance. ELSEVIER SCI LTD was discovered to be the second most important publisher, and SPRINGER was discovered to be the third leading publisher, having contributed to 13 publications in the study area. The following (Table 3) showed the frequency of research areas repeatedly publishing green finance study.

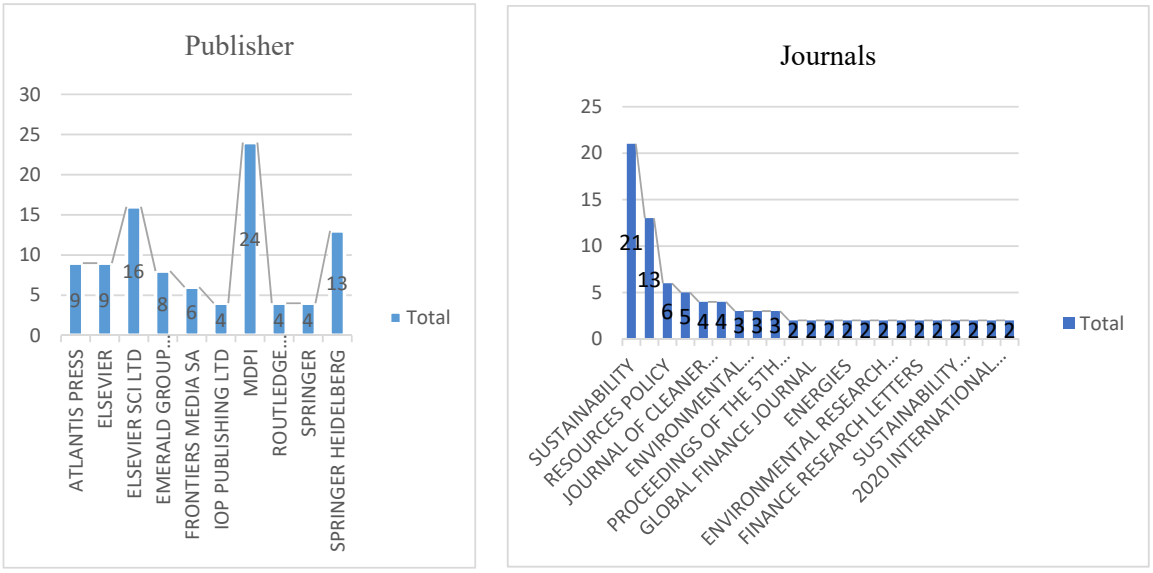


**Figure 5.** Major publishers and journals that have contributed to green finance.

**Table 3.** Frequency of research areas.

| Research Areas | Publication Times |
|---|---|
| Business and Economics | 35 |
| Environmental Sciences and Ecology | 30 |
| Science and Technology—Other Topics; Environmental Sciences and Ecology | 22 |
| Energy and Fuels | 5 |
| Business and Economics; Energy and Fuels; Environmental Sciences and Ecology | 5 |
| Science and Technology—Other Topics; Engineering; Environmental Sciences and Ecology | 4 |
| Social Sciences—Other Topics | 3 |
| Mathematics; Science and Technology—Other Topics | 3 |
| Business and Economics; Science and Technology—Other Topics | 3 |
| Environmental Sciences and Ecology; Meteorology and Atmospheric Sciences | 3 |

In terms of journals, the journal of SUSTAINABILITY (Switzerland) was found to contribute the most published content connected to the subject of green finance, with 21 documents published. The Journal of Environmental Science and Pollution Research and the Resource Policy Journals were second and third, respectively. The data revealed that these journals published 40 publications connected to the subject of green finance.

### *3.5. Country's Contribution to Green Finance*

This analysis is critical to the geographical distribution of green finance studies. Country-level analysis of green finance research revealed significant variation. Because of a large number of authors and countries covered, the items in Figure 6 are based on the top 10 countries that contribute the most published content connected to the subject of green finance. According to our findings, China, Pakistan, and the United Kingdom are the top three countries that contribute to green finance research. China is the most active country, as 73 authors from various institutions have contributed to studies.

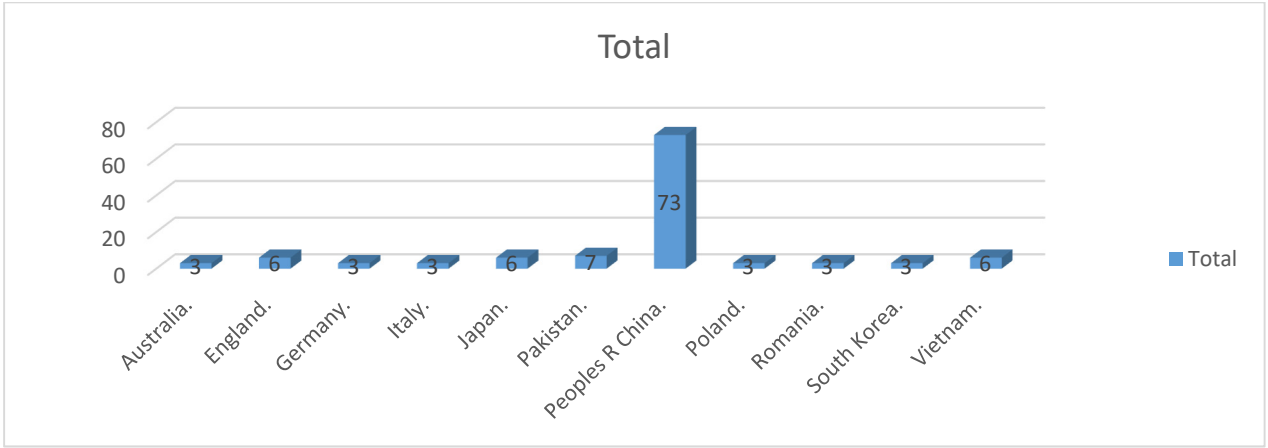


**Figure 6.** Countries that have contributed to green finance research.

By continent, Asia leads the world in studying green finance, whereas Europe is second. On the other hand, among the 146 studies used in this research, only two documents were

published from African countries (i.e., Nigeria and South Africa). It is necessary for more countries to contribute to research on green finance.

### *3.6. Methodological Characteristics of Reviewed Studies in Green Finance*

We also examined the methodological aspects of the studies under question, which differ in terms of data collection and analysis methods. To do so, we created a subgroup to collect studies with similar methodological characters but different terminologies. We avoided documents with no methodological approach. Our study found that many different methodological research designs have been used to investigate green finance. Text analysis was the preeminent method of analysis (26 documents used this methodology), while econometric analysis, trend analysis, comparative analysis, cluster analysis, and content analysis were also commonly used. Figure 7 shows the details of methodological characteristics used by previous researchers.

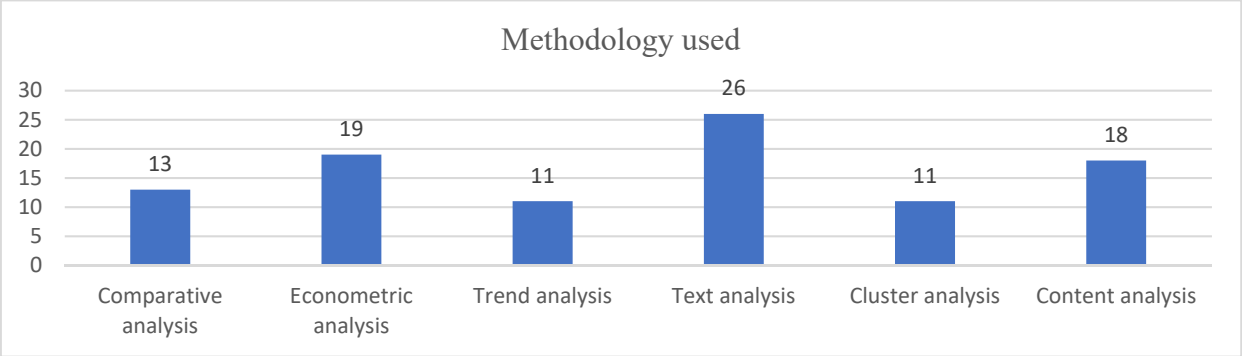


**Figure 7.** Methodological characteristics of the reviewed studies.

## 4. Discussion

We conducted a systematic review of academic writing on the subject of green finance. We discovered that green finance has gained a lot of attention from different authors across the world. China contributes the most studies in the area of green finance, and England, Pakistan, and Vietnam also contribute significant research on the subject. African and Arab countries, however, are not contributing much to green finance research. It is essential that developing countries increase their contribution to green finance research, as it would help develop a future green economy. The majority of African countries' primary objectives are poverty reduction, and natural resources are used to overcome this issue, even if there are environmental consequences. Therefore, these countries need to rethink their commitment to green finance in order to create more balanced economic activity. More focus should be given to countries who are neglecting this type of research, as a promotion of such studies could result in positive economic stimulation [40].

Despite the progress in the research of green finance, the financial gap for making a green investment is still sizable, and there are few solutions for fixing this gap [33]. The 2021 UNEP report [5] argued that it needed USD 4.1 trillion to fill the current financing gap by 2050, calling on all stakeholders to find a way to leverage this gap. Furthermore, the credit provided by the financial sector is insufficient to lessen the green financing gap [41]. As such, a significant increase in private sector investment into nature-based solutions is required.

According to the findings of earlier studies, private investors are falling behind in terms of their financial contributions to green investment. In the future, private capital will be required in large amounts. However, a variety of microeconomic challenges, such as internalizing environmental externalities [42], information asymmetry [43], issuers' and investors' analytical capacity [44], and risk-return trade-offs are some of the key problems. The coordination among large and small businesses in terms of loans and investments are required to address the green finance gap [25]. Regulatory bodies such as governments

and central banks should play an active role in enhancing green finance, as should private investors [23]. These incentives can be provided through a tax break or cost of capital and could be implemented through legislation, government, and regulatory means to promote green financing [45].

The studies conducted by [11,18,37,45,46] imply that one of the most significant issues with green finance is financial industry regulation, which has a lack of coordination between financial and environmental policies. This was shown in a cross-country study conducted by [14], which suggested that financial institutions are unable to report and disclose their environmental risks. This needs to be corrected and mandatory environmental risks should be disclosed in the financial statement of the banking sector, as the assets of the banking sector account for a significant portion of the world's financial assets [47].

The green finance development gap can be minimized by promoting coordination across the world by involving all concerned stakeholders [48]. However, existing green finance methods (i.e., climate finance, climate credit, green bond, and green fund) were found to be insufficient strategies to fill the financing gap, as their method of financing is similar and they are highly dependent on financial institutions and government (e.g., issuing a green bond and providing green credit). Therefore, more consideration should be given to enhancing green finance.

## 5. Future Agenda

Investing in climate change requires a significant financial commitment; estimates range from USD 1.6 to 3.8 trillion per year for the global energy system's supply-side until 2050. In developing countries alone, the financing gap for achieving SDGs is estimated to be USD 2.5 trillion per year [37]. Domestic credit from banks is not sufficient to achieve this level of green financing. Capital mobilization for green investments has been limited due to several microeconomic challenges, such as maturity mismatches between long-term green investments and investors' relatively short-term time horizons.

There is a significant green finance gap across the world. Previously conducted studies highlighted the existence of a green finance gap, indicating that it should be mandatory for countries to increase the level of private investment given to green investment. However, the trend of risk-return and regulatory issues are the main problems that hinder private investors to give to green investment. Therefore, future researchers should examine why governments, regulatory bodies, and financial institutions do not encourage private investors to give to green finance by using different initiatives. Furthermore, the majority of financing methods used by different countries and institutions are highly dependent on governments and financial institutions. However, creating a portfolio for this kind of investment would greatly benefit the current financial gap. Furthermore, future research should focus on the statistical contributions of each country toward green initiatives, as agreed on in the Paris Agreement. The measure of how commitments have translated into action and accounting for those who fall short should be considered across the world. Finally, in terms of its impact, environmental consequences will impact all human and non-human activities, and government, financial institutions, or regulatory bodies are not the only entities responsible for addressing climate accountability. Future research should consider how individuals and households could contribute green finance.

## 6. Conclusions

Our study highlights the overall trends and patterns in the research and academic discussions surrounding green finance, green investment, and the green finance gap. We also provide information on which authors, countries, publishers, and journals have contributed the most published content to the subject of green finance. The methodological approach used in reviewed documents was found as a benchmark for authors interested green finance. Our review showed that there is still a significant green finance gap for inclusive green growth. It is the responsibility of all stakeholders to increase the level of green financing. The financial gap in green investment is a result of inconsistencies in

financial and environmental policy. Therefore, proper policies and regulations are needed to address certain issues. Governments should play a larger role by enacting appropriate environmental policies that force the financial sector to help financial markets become more sustainable.

Some limits to our study are as follows. One, we only examined studies published after the 2015 Paris Agreement and we also did not consider studies published before that. Naturally, then, we were unable to investigate the response of academic writers before and after the Paris Agreement. In addition, we extracted documents from two databases. However, future studies could use more databases to collect more documents to investigate what approaches have been used by other scholars to study the issue of the green finance gap.

Additionally, we recommend that future studies look out how green finance and green investment could deliberately affect green growth. It would also be interesting to see what possible incentives could entice private investors to make green investments, and what additional green financing methods could be introduced to address the financing gap. Finally, future studies consider the status of each country in terms of green finance mobilization and capital contribution in order to share the specific experience of that country and what lessons could be learned from that country. At the same time, authors from around the world should investigate why Arab and African countries are lagging behind in green finance academic contribution.

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