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# Unveiling the Factors Shaping the Expansion of Green Bonds: A Comprehensive Study

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***Abstract*:** Though the market of GB issuance is booming yet there is absence of thorough summaries. This research emphases on the finding the factors affecting the GB emergence and expansion which requires systematic review and bibliometric analysis to be employed to give qualitative and quantitative information about Green bonds. The study examined 646 peer-reviewed academic papers from 2007 to 2022. It was also used to identify notable works, outline the logical arrangement of the grounds, and categories any openings within that structure. The bibliometric study of 646 papers revealed prominent authors, institutions, nations, and themes. This study uncovers several prominent themes that emerged during the analysis, including sustainability, GBs, green or sustainable finance, sustainable investment or development. The three significant subjects identified are the connection between GB supportability and environmental change financing, the connection between GB and determinants, and the link among GB and regular bonds. These themes played a substantial role in shaping the research findings and are indicative of the key areas of focus within the field. An overall calculated structure that shows the higher perspective has decreased the research zones. This review will aid authors, controllers, and educators to know the current place of green bond work and helps to understand the topic.

***Keywords:*** *factors, determinants, systematic review, green bonds, green financing, factors, themes, Bibliometric analysis.*

## 1. Introduction

Humankind had suffering due to the rapid shift in climate, which requires thevarious nations to come together in maintaining eco-friendly and developing economy which should also be sustainable.The Marrakesh Conference of Parties (COP) placed its emphasis on addressing climate-related challenges by integrating adaptation and mitigation strategies, along with financial mechanisms, to reduce emissions and tackle climate risks (World Bank, 2017b). The SDGs for 2030, recognized by the UNDP, are a global initiative aimed at addressing hunger andpoverty while encouraging justice, sustainability, peace, and human rights (United Nation, 2015).Introduction of the "Strategic Framework for Development and Climate Change" with the primary objective of coordinating and promoting collaborative efforts between the public and private sectors to combat climate change, which was introduced by the World Bank in 2008. Its aim was to mobilize action and resources to address climate-related challenges effectively(World Bank, 2017a). The Climate Change Vulnerability Index assessed the vulnerability of humans to extreme events resulting from climate change. The index projected that over the next 30 years, 15 countries, including various cities of India will face significant or high risk due to rapid urbanization and climate variation(Kissinger, Gupta, Mulder, &Unterstell, 2019).

Academics and researchers have shown increasing interest in defining the concept of sustainability. It is evident that to improve sustainability, we need the safeguarding and diligence of project results. Among a number of factors influencing project sustainability, the availability of funding sources has been identified as a major obstacle to promoting sustainability (Savaya, Elsworth, & Rogers, 2009). The growing concerns surrounding sustainability and ethical considerations have resulted in the increased popularity of certain tools and approaches among ethical investors. This trend has been particularly noticeable over the recent years (Hacıömeroğlu, Danışoğlu, & Güner, 2022).

In addition to their inherent focus on sustainability, green bonds appear to provide investors with a viable option to diversify their holdings in traditional financial instruments like regular bonds. This becomes

particularly valuable during times of severe market turbulence resulting from pandemics, natural disasters, or other significant occurrences, as green bonds offer an betteroption for investors to navigate through such situations while maintaining their commitment to sustainability(Naeem, Farid, Ferrer, & Shahzad, 2021).The issuance of GBs directly impacts the sustainability of the economy as the funds are allocated to priority areas(Draksaite, Kazlauskiene, & Melnyk, 2018)(Mankata, Owusu-Manu, Hosseini, & Edwards, 2020). Green bonds may finance ecologically friendly projects, as they are the key to overcoming climate change concerns (Banga, 2019)(Banga, 2018). The enhancementof debt markets in funding environmental sustainability initiatives goes to the GB market. It acknowledges the social co-benefits of green projects, allowing borrowers to define the usage of green bonds based on the project's primary objectives (ICMA, 2018). Green Bonds have provided finance for a varied range of ecologically friendly projects, including, sustainable waste management, , green buildings, clean transportation, biodiversity conservation, renewable energy, sustainable land use, and clean water initiatives (ICMA, 2018). The concept of "green growth" emerges as a strategy to achieve economic prosperity while minimizing the adverse impacts of climate change. This entails optimizing the interplay between economic growth and eco-friendly practices (Noh, 2010)

In an era marked by escalating environmental concerns and the urgent need for sustainable solutions, the rise of green bonds has catalyzed a transformative shift in the financial landscape. As the global community faces with the complexities of change in climate, resource depletion, and ecological degradation, green bonds have emerged as a beacon of hope a bridge connecting the realms of finance and environmental stewardship. These innovative financial instruments represent a fusion of economic growth and ecological responsibility, offering a potent means to fund projects that not only contribute to returns but also contribute to a more sustainable yet to come future.

The GB’s genesis can be traced back to a collective recognition of the imperatives of sustainable development. In particular, climate change emerged as a defining global challenge that necessitated novel tactics to financing the low-carbon transition, resilient economy. Climate awareness bonds (CABs) were introduced in 2007and have since become the major category of GBs, with a issuance of around £23.5b total in 11 denominations by 2017(Verma & Agarwal, 2020). The first ever GBwas issued by the EIB in 2007,trailed by the World Bank's GBin 2008 for institutional investors. The World Bank and IFC jointly launched the Nikko AM/World Bank fund in 2009 which included the first green bonds.Global green bond issuance has reached USD 40 billion, with significant growth observed worldwide. The USA People's Republic of China and France have been pioneers in green bond issuance(Verma & Agarwal, 2020). Fannie Mae currently holds the highest market capitalization at USD 20.1 billion, followed by China's Industrial Bank Co at $9.6 trillion and France at $6 trillion. In 2007, a report by the Geopolitical Board on Climate Change,a UN agency, attributed global warming to human activities, which inspired Swedish pension funds to consider investing in environmentally beneficial projects(D Y Tang & Zhang, 2020)(Cotton, 2020)(Verma & Agarwal, 2020).Over 50 countries have issued green bonds, with the USstanding at first in terms of issuance. The Climate Bonds Initiative provides valuable information for tracking the progress of the GB. It is projected that global GB issuance will reach $350 billion in 2020, according to the IFC(IFC, 2021).

Governments, organizations, and individuals worldwide acknowledged the need to align financial mechanisms with environmental objectives, giving rise to the concept of green bonds.

Before this evaluation, there have been few literature reviews in the past two decades that specifically address various aspects of Green Bonds. These reviews tend to focus on narrow topics and do not provide a comprehensive overview of the entire scope of Green Bonds. Moreover, we couldn't find any research that thoroughly explores the factors influencing the emergence of Green Bonds or offers a holistic framework for understanding their growth. Additionally, there is a lack of emphasis on analyzing the conceptual and intellectual patterns in this emerging field of study. Due to these deficiencies, we sought to produce the present research and propose a direction for future study by integrating qualitative and quantitative techniques. This study utilizes a rigorous and effective approach called bibliometric analysis and systematic literature review, which is considered the most objective and powerful method for examining various aspects of the subject matter (Paul, Khatri, & Kaur Duggal, 2023). This is the first complete literature study and bibliometric analysis of Green bonds ever done. The aim of this overview is to provide a concise summary of the latest advancements in

the field. Its ultimate objective is to support professionals, policymakers, educators, and researchers in their respective endeavors.

Research Q1: Describe the factors and criteria that impact the issue of GB as opposed to Traditional bonds in several significant articles on green bonds.

Research Q2: What have been the utmostsignificant analyses and research themes in this area?

Research Q3: What are the present tendencies in Green Bonds publishing in terms of period, papers, fields, authors, associated nations and institutions, kind of research, and economy?

Research Q4: Where are the research holes and future research needs?

The rest of this document is formatted below:

Part 2 addresses the contribution and novelty of the research, Part 3 includes review of the significant literature significant for the research objective, Part 4 examines the data search and analysis methodologies, Part 5 provide the result of the various objectives laid down for the study which is divided into four parts namely study of factors, performance analysis, science mapping and content analysis, while conclusion is offered in Part 6, Part 7 evaluates the limitation of the study.

## 2. Contribution and Novelty

When creating a review article, it is crucial to ensure that it brings something unique and valuable to the table. If a specific topic has previously been broadly discussed in high-quality reviews, reiterating it does not contribute to existing area of knowledge. Nevertheless, if a review offers fresh and distinct insights on a well-known subject, it can still be considered novel. It is important to emphasize that novelty alone is not enough; the theme and content of the review should also be relevant to the existing literature, society and area in order to make a meaningful impacton the body of research. Editors often prioritize the assessment of a framework-based review based on its novel contribution(Khatri, Dutta, & Kaushik, 2021; Lim, Yap, & Makkar, 2021).

## 3. Literature review

Climate awareness bonds (CABs) were first sold in 2007 and the company has since grown to be the biggest issuer of green bonds in world, issuing about £ 23.5 billion worth in 11 denominations by 2017 (Verma & Agarwal, 2020). Everything was created by the EIB in 2007. A GB was instigated for institutional investors by the “World Bank” in 2008. In 2009, the WB and IFC together created the Nikko AM/World Bank fund, which included the first green bonds. Green bond issuance has climbed to $ 40 billion globally. Green bond issuance is soaring all around the world. It reached $167.3 trillion in 2018, up 3% from the previous year. In 2018, the USA, People Republic of China, and France hang onto the tag of pioneers of green bonds issue (Verma & Agarwal, 2020). Fannie Mae is still the world largest issuer with a market capitalization of $ 20.1 billion. China's Industrial Bank Co. issued $9.6 trillion, with the Republic of France leading the way with $6 trillion (Verma & Agarwal, 2020). It have been issued by more than 50 countries, with the United States being the biggest one. CBI (climate bonds initiative) is an excellent resource for people interested in tracking the progression of the green bond marketplace. Global green bond issuance is expected to reach $350 billion in 2020, according to the group (IFC, 2021).

In India, Yes Bank issued INR 1000 crore green bonds in 2015, followed by CLP India's INR 600 crore issuance in 2016. The first universal approved GB issue was issued by Axis Bank Limited, with a USD 500 million issue. SEBI had implemented the Green Bond Guidance in 2016, which was followed by major bond offerings by 2018. This demand grew to INR 50000 crores. SBI released $650 million in Green Bonds from the market in 2018, which were purchased by power companies such as Renew Power and Greenko, as well as other Indian players. Greenko just released 950 million dollars. In India, green bond issuance is expected to exceed $200 billion (Verma & Agarwal, 2020). It increased to USD 198 billion in 2018. The board of the Kerala Industrial Infrastructure Fund (KIIFB), the first issuance issued by a government body, is projected to collect USD 250 million on businesses is increasing by the day; in 2016, According to the group, global green bond circulation is estimated to exceed $350 billion by 2020.. India is ranked 110th out of 149 countries in terms of achieving the (SDGs). The SDG Bond Structure, which was established in 2018, clearly distinguishes between environmental and social programs, allowing investors to spend appropriately. Before this assessment, only ainadequate number of literature reviews have been conducted on specific themes related to Green Bonds over

the past two decades. The majority of these reviews have a narrow focus, concentrating on single topics rather than encompassing the entire spectrum of Green Bonds. Moreover, we couldn't find any research that explores the conceptual and intellectual patterns within this emerging field of study. Recognizing these gaps, our objective was to synthesize existing research and provide a roadmap for prospective investigations by employing both quantitative and qualitative methods. This comprehensive literature study and bibliometric analysis represent the first of its kind in the realm of Green Bonds. The purpose of this overview is to summarize the latest developments in the field and ultimately support practitioners, policymakers, educators, and researchers in their respective endeavors.

## 4. Method

The research utilizes “bibliometric analysis”, specifically through SLRespecially SPAR 4 SLR(Paul et.al., 2021), as a widely employed method to assess the information autonomy of a research field(Li et.al., 2017) used the methodology for literature review also included in this paper(Paul et al., 2023). This studyemphases on the effective utilization of quantitative techniques using bibliometric information to evaluate the whole collection of a research articles within the field(Sahoo et al., 2022). Methods, ideas, and conceptions that are often employed are examined in the structured review. (Rosado-Serrano, Paul, & Dikova, 2018), Based on a set of rules (Paul & Benito, 2018), Incorporating elements of a narrative and a research agenda-setting framework (Dabić et al., 2020), theorem-driven evaluation (Gilal et al., 2019), review of the bibliography (Randhawa et al., 2016) and the creation of models and frameworks (Paul & Mas, 2020), meta-analysis (Knoll & Matthes, 2017). Literature summaries (Tranfield et al., 2003), bias reduction, and possible research gaps are all achieved by systematic literature reviews (Talan & Sharma, 2019), (Kumar et al., 2019); (Paul & Benito, 2018). This research use bibliometric and a systematic examination of the literature in a manner similar to that utilised by (Doi et al., 2018). Most often, bibliometric(Li et al., 2017) is a strategy used to analyses research themes and trace the knowledge architecture of a study field (Blanco-Mesa et al., 2017). Content analysis of the significant topics after a bibliometric study is undertaken, in order to delve deeper into the area (Baker et al., 2020).

Maximum prevalent bibliometric approaches for identifying connections between cited and cited sources are “citation” and “co-citation analysis” (Small, 1973). Instruments like publication tendencies and analysis of network citation are used in this investigation. (Paul & Benito, 2018), (Paul & Rosado-Serrano, 2019). Content analysis for grouping, investigation of keywords, analysis of co-authorship patterns, and systematic examination of new papers are also carried out (Wang, Wang, Wang, & Xu, 2020). VOS Viewer was utilised to conduct the analysis. The distance between things may be used to explain the relatedness of items in VOS Viewer's map. The closer the things are together, the shorter the gap between them (van Eck & Waltman, 2010). Vos- Viewer is centered on the concept of "visualising similarities" (VOS). The VOS viewer was used to perform citation analysis, analysis of co-citation, and keywords analysis. Firstly 646 articles were loaded into the VOS Viewer for examination. Here are the review criteria that are presented:

### a. Amassing of Documents

The research conducted a comprehensive review of past scholarly work to identify and gather a wide range of articles on Green Bonds. By obtaining valuable insights, the research was able to form various combinations of keywords for the study. The study focuses on the research of the Green Bond (GB) market and includes alternative names such as "climate bond" and "sustainable bond" based on previous literature(Argandoña, Rambaud, & Pascual, 2022)(Mathews & Kidney, 2012). An acceptable string of search idioms ("green* finance" OR "green bonds" OR "sustainable* finance") yielded 1226 results in the title, abstract, or keywords of each publication. After limiting the results to articles exclusively in English, the search returned 1178 hits.

The review utilized the Scopus database, known for its higher quality scholarly articles, as the primary source for conducting bibliometric analysis (Comerio & Strozzi, 2019; Norris & Oppenheim, 2007). Smaller number of results was shown by the Web of Science database. Therefore, the Scopus database was chosen for the data collection, resulting in the identification of 1178 relevant documents (Baas et al., 2020).

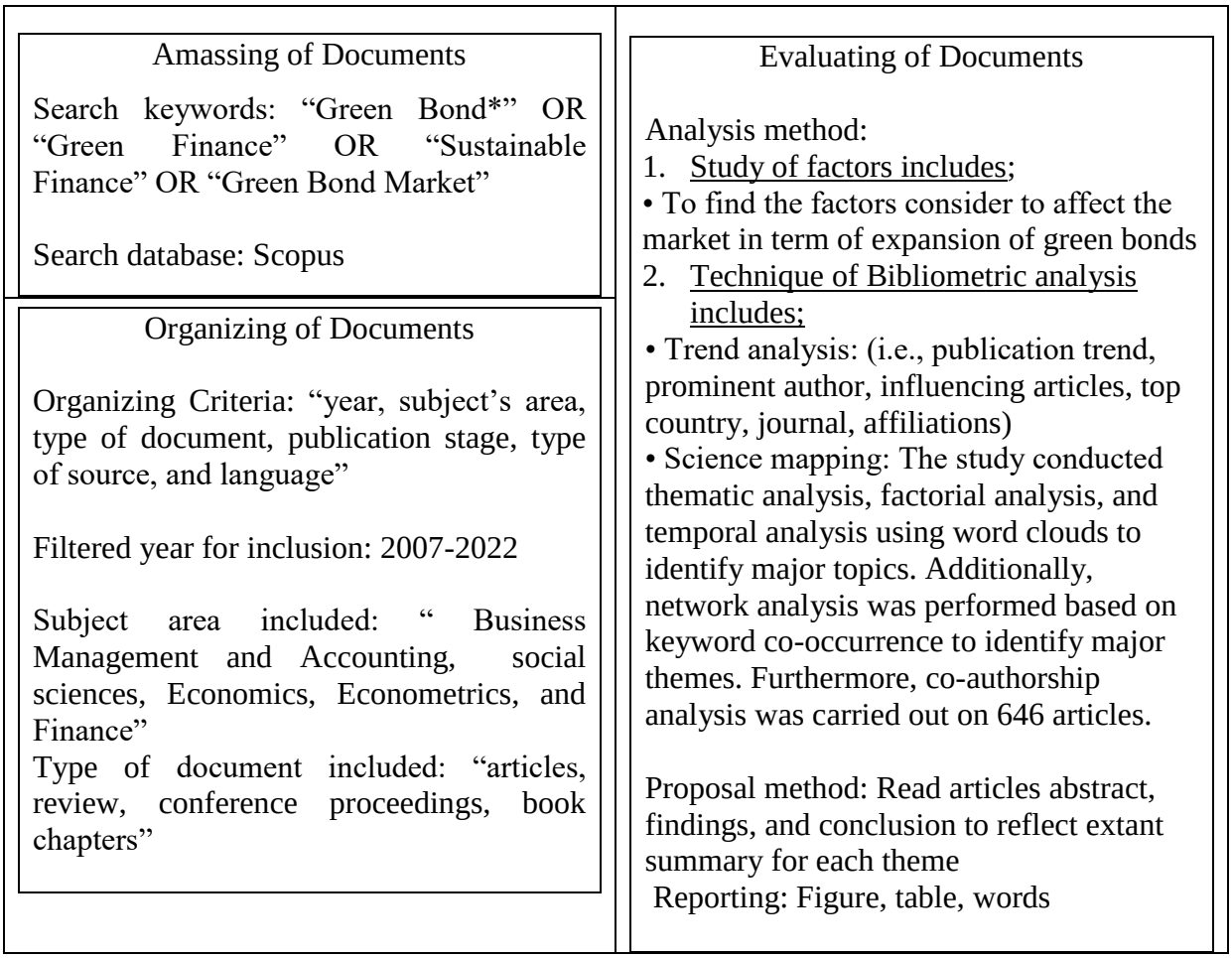


**Figure 1** SLR by SPAR 4 as per protocol(Paul et al., 2021)

Furthermore, a random verification process was carried out by cross-checking the information with various databases including Taylor & Francis, Google Scholar, Emerald, and Elsevier. (Goyal & Kumar, 2021), resulting in a corpus of 676 articles for review.

**b. Evaluating the Documents**

Methods, ideas, and conceptions that are often employed are examined in this structured review. (Rosado-Serrano et al., 2018), Based on a set of rules (Paul & Benito, 2018), Incorporating elements of a narrative and a research agenda-setting framework (Dabić et al., 2020), theorem-driven evaluation (Gilal et al., 2019), review of the bibliography (Randhawa et al., 2016) and the creation of models and frameworks (Paul & Mas, 2020), meta-analysis (Knoll & Matthes, 2017). Literature summaries (Tranfield et al., 2003), bias reduction, and possible research gaps are all achieved by systematic literature reviews (Talan & Sharma, 2019), (Kumar et al., 2019); (Paul & Benito, 2018). This research use bibliometric and a systematic examination of the literature in a manner similar to that utilised by (Doi et al., 2018). Most often, bibliometric(Li et al., 2017) is a strategy used to analyses research themes and trace the knowledge architecture of a study field (Blanco-Mesa et al., 2017). Content analysis of the significant topics after a bibliometric study is undertaken, in order to delve deeper into the area (Kent Baker et al., 2020).

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## 5. Results

### a. Study of Factors

The research scope is determined by analyzing the literature on the factors that contribute to the success of issuing green bonds, as well as understanding the interconnected benefits and challenges associated with the issuance of these bonds(Bužinskė & Stankevičienė, 2023). From that purpose, total of 127 papers selected based on selection criteria is applied based on the “factors” or “determinants” affecting the green bonds which further refined the documents in scopus to limit the documents which published in journal rated under ABDC and CABS journal quality list from the period of 2016-2022. This criteria is used because very less research is done on the aspects / determinants that distress the overall working of green bonds in comparison with the conventional bonds. This list will helps the readers to further analyses and understand in details the working of green bonds to the complete extents. These documents further helps the reader to get in contact with the latest development in the field of green bonds and further improve the knowledge on the green financing.
The list of factors selected defined as follows in table 1

(Table 1 providing information on various factors affecting green bonds based on the literature)

| Factor recognised based on literature | Reference | Inference / Conclusion / Finding |
|---|---|---|
| Risk volatility | (L Pham, 2016)(D. Park, Park, & Ryu, 2020)(Linh Pham & Luu Duc Huynh, 2020)(Liu, Liu, Da, Zhang, & Guan, 2021) | Volatility of other markets has no impacts on the green bonds markets leads to much stable issue |
| Improve Sustainability | (Flaherty, Gevorkyan, Radpour, & Semmler, 2017)(Kanamura, 2020)(Maltais & Nykvist, 2020) | The empirical section reaffirms climate bonds key features, including low inflation rates and low interest rates. Despite market instability, investors remain interested in purchasing long-term green bonds due to their association with sustainability. |
| Shareholder wealth | (Mohd Roslen, Yee, & Binti Ibrahim, 2017)(Baulkaran, 2019) | share price and shareholder wealth is positively affected by the news of company issuing the green bonds |
| Pricing | (Hachenberg & Schiereck, 2018) | Green bonds pricing perform better than its counterpart in secondary market |
| Type of issuer | (Hachenberg & Schiereck, 2018)(Chiesa & Barua, 2019) | Issuers related financial, government , or companies having higher esg rating tend to perform better |
| Ethical Governance | (Paranque & Revelli, 2019)(Chiesa & Barua, 2019) | “asset-backing/traceability/impact measurement” |
| ESG /Credit rating | (Hachenberg & Schiereck, 2018)(Chiesa & Barua, 2019)(S Barua & Chiesa, 2019) | Higher rating means better performance which in turns to more issuance by other companies |
| Collective management | (Paranque & Revelli, 2019) | It aims to involve various stakeholders in the "translation" process, ensuring their participation in establishing and managing the necessary resources. |
| Regulation arbitrage/ government support | (Cao, Jin, & Ma, 2021)(Kariyawasam Galoluwage Madurika Nanayakkara & | Loosened legal implication/ restrictions on the companies issuing green bonds |

| | | |
|---|---|---|
| | Colombage, 2021) | |
| Legal framework/ policies on Green bond | (Chiesa & Barua, 2019)(Mankata et al., 2020) | Policies supported green bonds issuance provided by the countries |
| Transparency | (Fatica & Panzica, 2021)(Agliardi & Agliardi, 2019a) | Clearly defined usage and transparency of proceeds |
| Carbon footprint /co2 reduction | (Gianfrate & Peri, 2019)(Maltais & Nykvist, 2020)(Hung, 2021b) | Its helps in decarbonizing the issuer portfolio, investments and companies projects |
| Reputation of issuer | (Cheng, Sharma, & Broadstock, 2023)(Bhutta, Tariq, Farrukh, Raza, & Iqbal, 2022) | Prestige and reputation also plays factors in green bonds issuance |
| Esg score | (Cheng et al., 2023)(Bužinskė & Stankevičienė, 2023)(Nofsinger & Varma, 2014) | Esg based investments normally outperforms the counterparts and shows resilient performance |
| Third party verification | (Bachelet, Becchetti, & Manfredonia, 2019)(Russo, Mariani, & Caragnano, 2021) | Information asymmetry and green washing risk can be remove with the verification process leads to better liquidity |
| Size of issue | (Bhutta et al., 2022)(K G M Nanayakkara & Colombage, 2020)(Suborna Barua & Chiesa, 2019) | Larger size leads to better liquidity in turn better investment opportunity of green bonds |
| Qualification criteria | (Mankata et al., 2020) | Defining "Green " has led to less green washing and more success of bonds |
| Investor sentiments | (J Piñeiro-Chousa, López-Cabarcos, Caby, & Šević, 2021) | Twitter helps the green bonds earns positively as the sentiments play major role in the green bonds returns |
| Better liquidity | (K G M Nanayakkara & Colombage, 2020)(Linh Pham & Luu Duc Huynh, 2020)(R. Zhang, Li, & Liu, 2021) | Larger size leads to better liquidity in turn better investment opportunity of green bonds |
| Reporting process/ information sharing | (Sangiorgi & Schopohl, 2021)(Sanderson, 2018)(Hyun, Park, & Tian, 2021) | Timely and regular reporting allow the investors to invest more in the market |
| Tax incentive | (Agliardi & Agliardi, 2019a)(Flaherty et al., 2017) | Tax advantage to the issuer also allow the companies to choose green bonds over its counterpart |
| International standards | (CBI, 2016)(Wiśniewski & Zieliński, 2019)(Dou & Qi, 2019)(H. Zhang, 2020)(International Capital Markets Association, 2020) | Standards helps in improving the confidence, assurance and certification which leads to better transparency and better growth. |
| Institutional management | (Banga, 2019)(Sangiorgi & Schopohl, 2021) | Lack of institutional arrangement or management can hampers the green bonds development |
| Green awareness | (Agliardi & Agliardi, 2019a)(Bagnoli & Watts, 2020) | Due to large focus is on improving or reducing the emission or greenness which turn the general public green conscious |
| Cost of capital | (R. Zhang et al., 2021) | The introduction of specific channels for green bond issuance can have a positive impact on corporate cost of capital. |
| Return on assets | (Zerbib, 2019)(Naeem, Adekoya, & Oliyide, 2021) | Provide relative similar or better return |
| Market yield | (Chang, Feng, Liu, Lu, & Li, | Yield spread is greater in green bonds in |

| | | |
|---|---|---|
| | 2021)(Febi, Schäfer, Stephan, & Sun, 2018)(Zerbib, 2019) | comparison to corporate bonds if there is better credit rating or liquidity |

On the basis of the various factors which is isolated on the basis of thorough reading the various paper downloaded from the scopus database and used them and divided the factors on four categories for easier understanding of the bigger picture of the effect on the expansion or growth(Khalid & Rajaguru, 2018)(Teplova & Sokolova, 2018). This research will provide base for future research on more streamlining the factors to make it suitable for the current market scenario and will help to conclude which factors responsible for the widespread of the green bonds issuance in not only developed market but the the developing economy like India, China and others.

Figure 2 helps to easily understand the various factors categorising in the four category namely the Financial factors, Infrastructural factors, Social or environmental factors and economic or Political factors (Khalid & Rajaguru, 2018).

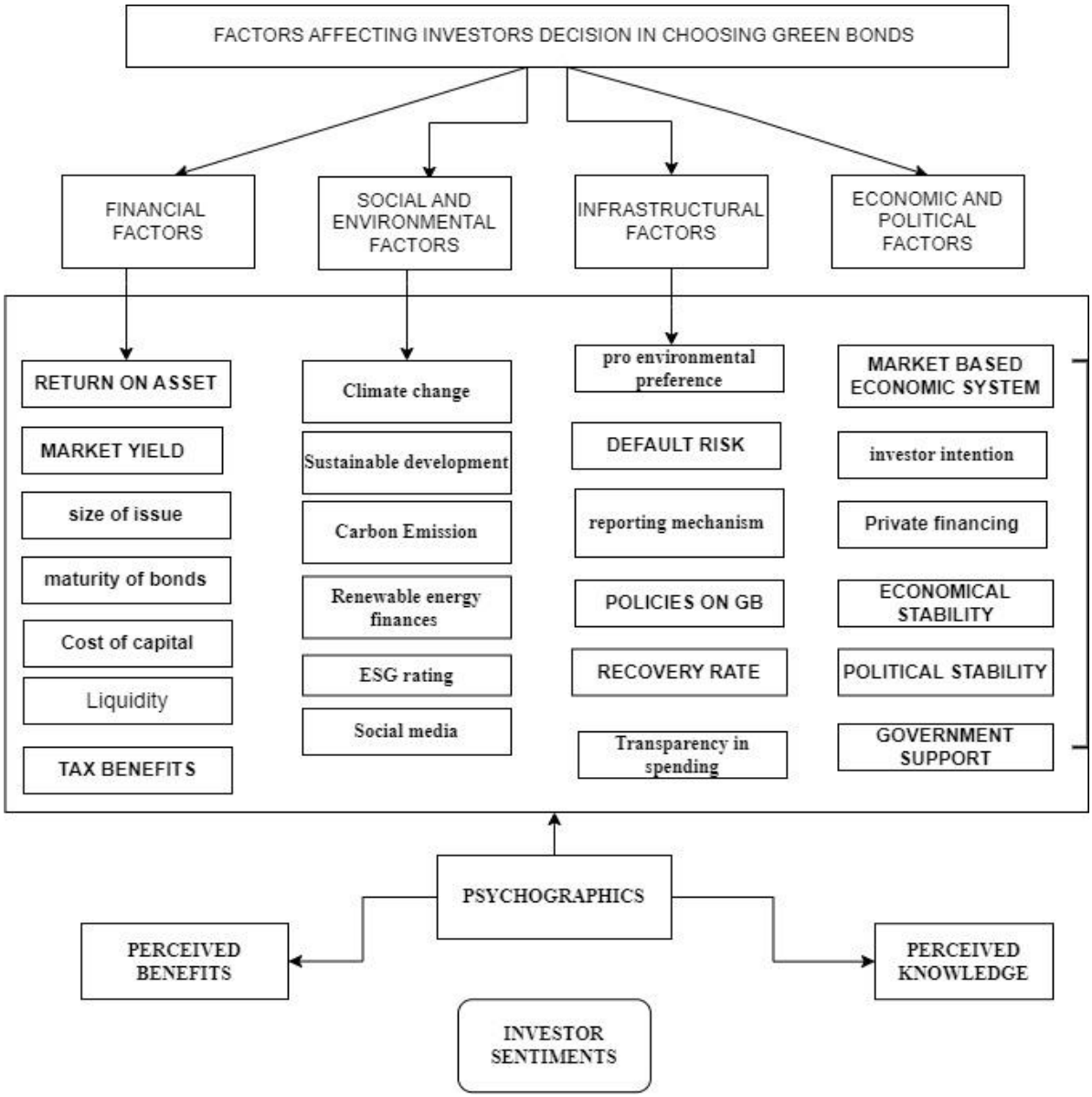


**Figure 2** defining categories of factors affecting green bonds issuance

**b. Performance Analysis**

The study conducted ananalysis of performance to examine the research area specific to green bonds. This analysis included the trend of publication, influential articles, top authors contributing to field, affiliations, and countries(Donthu, et.al, 2021). Figure 3 provides an overview of the analysis tools used in the study.

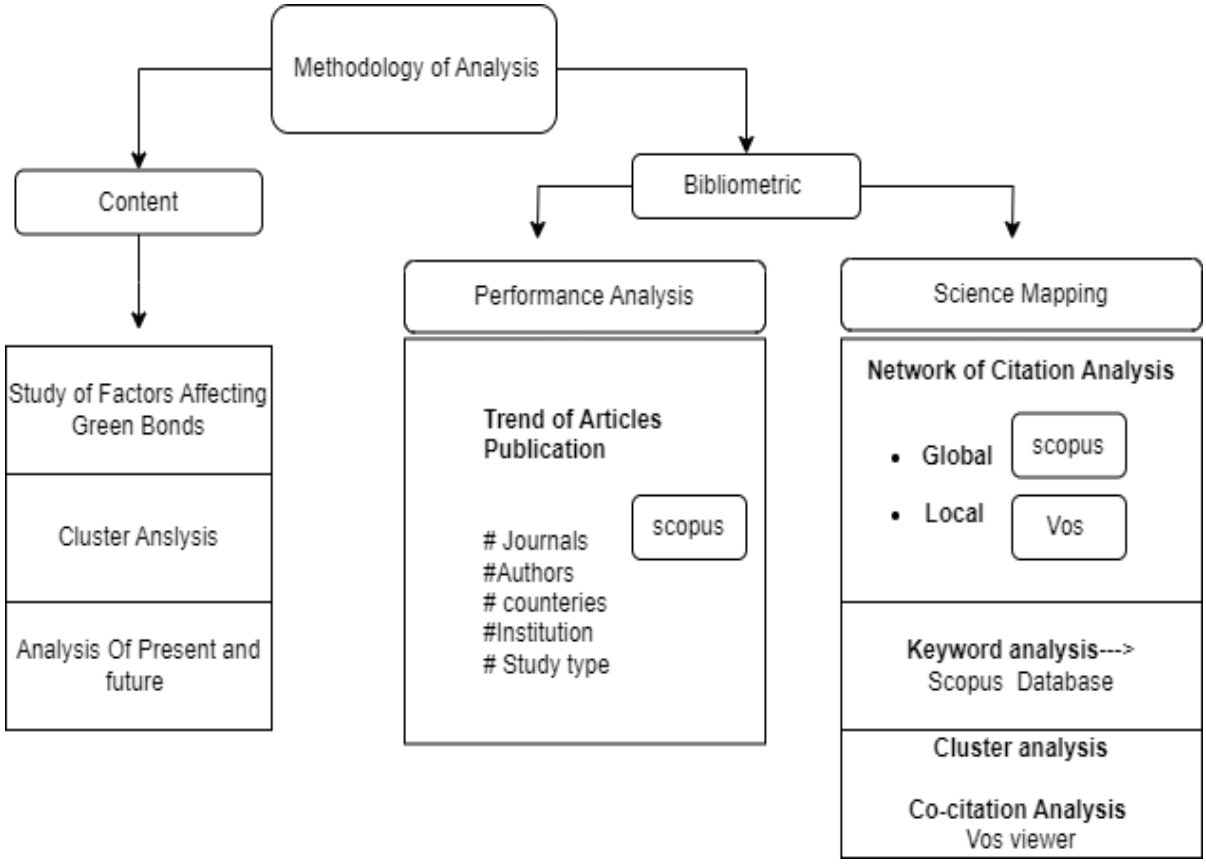


**Figure 3**explaining the methodology of the Analysis as per(Donthu, et.al, 2021)

**i. Publication Movement Over Interval**

Figure 3 shows the Green Bond evolution of literature available in the WOS data from 2007 to 2021. The articles published has increased dramatically in numbers, from one in 2007 to 214 in 2021. When the Geopolitical Board on Climate Change (a UN agency) published a report in 2007 linking global warming to human activity, interest in Green Bonds skyrocketed. It inspired a number of Swedish pension funds to explore investing in initiatives that benefitted the environment. Because of this increasing demand, the World Bank released 1st green bond in 2008, which was a reaction to it. Since the main green security was circulated, the market has developed altogether, and as the number of green bonds distribution has enlarged, similarly, the quantity of green bond publications has increased, with the largest percentage rise of more than 100 percent occurring in 2019 and a 30 percent increase occurring in 2021.

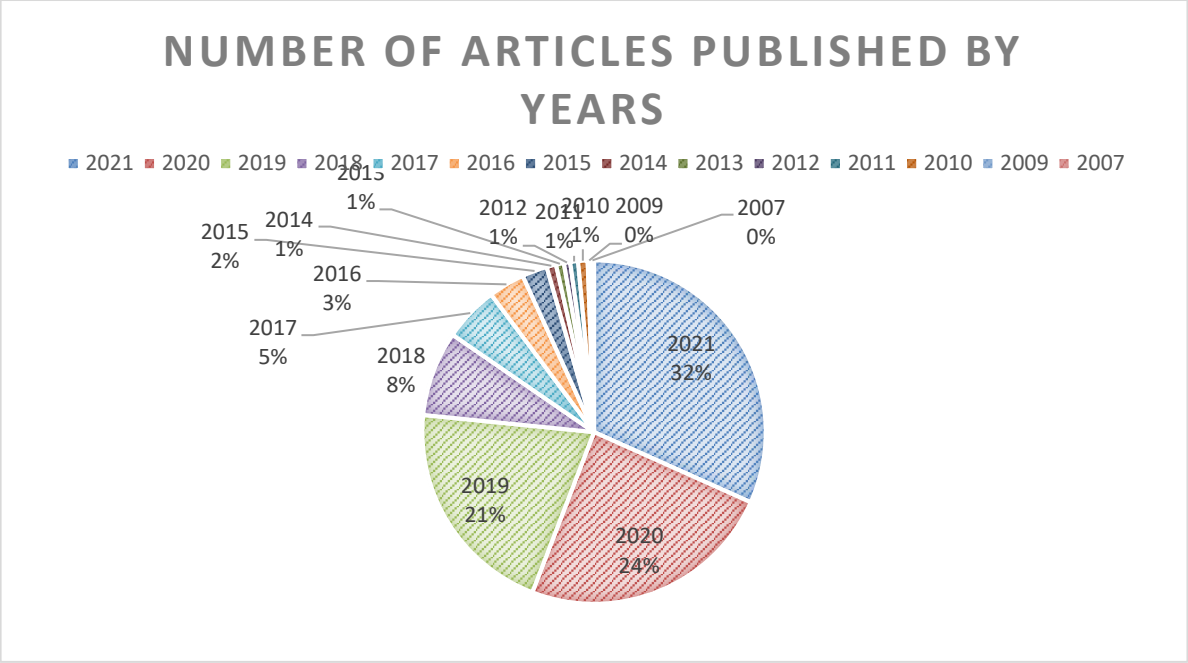


**Figure 4**evolution of green bonds literature

**ii. Sources of information**

During the course of the research, 646 articles from 338 distinct publications would be analyzed. Journals that publish papers on green bonds may be found in Table 2. Of the total 260 papers, 260 were published in the top 15 journals, making up 40.25 percent of the total. Green Finance (60 articles), followed by "Sustainability" (43 articles) is the most prolific platform. The inclusion of green bonds in these periodicals is justified since they reflect a society's interest in the market. As shown by their excellent rankings from both the "Australian Business Deans Council" (ABDC) and the "Chartered Association of Business Schools" (CABS), these journals are well-representative of the field. As seen in Figure 4, the domains of science, law, management, sustainable technology, and political science are all closely related to green bonds. Clearly, this is interdisciplinary in nature.

**iii. Prominent authors and the institutions and nations with which they are related**

More than 1,500 writers from 930 organisation in 78 countries have written on green bonds, according to our research. According to the number of publications they have, the top contributors are shown in Table 2. There are 11 publications by "Taghizadeh-hesary F" at the uppermost of the catalogue, followed by "Volz U" with 10 papers, "Bohnke J" and 8 others with 7 apiece. The most cited authors are "Taghizadeh-hesary F" and "Volz U", both with 1333 citations. Experts in the subject, the two writers have written extensively on themes such as green finance, sustainable financial management and company finance. With 228 citations, "ElettraAgliardi", an expert in financial markets and instruments, comes in third place.

Additionally, the main institutions affiliated with the issuers of green bonds are included in Table 3. The "University of London" has the most publications on green bonds with 29. "The Central University of Finance Economics" and the "Ho Chi Minh City University Economics" are rated second and third, respectively, with 13 publications apiece. "Tokai University" and the "London School of Oriental and African Studies" (SOAS) are the next three most prolific universities in "China", each with 11 publications to their credit.

**Table 2** the most prestigious publications in the field of green bonds publish regularly.

| Publication Titles | Record Count | ABDC Rating | ABS Rating | Publishers | Record Count |
|---|---|---|---|---|---|
| "GREEN FINANCE" | 60 | n/r | n/r | ELSEVIER | 145 |
| "SUSTAINABILITY" | 43 | n/r | n/r | SPRINGER NATURE | 70 |
| "JOURNAL OF CLEANER PRODUCTION" | 23 | A | 2 | MDPI | 69 |
| "ENERGY POLICY" | 17 | A | 2 | AMER INST MATHEMATICAL SCIENCES-AIMS | 61 |
| "ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH" | 17 | n/r | n/r | TAYLOR & FRANCIS | 46 |
| "FINANCE RESEARCH LETTERS" | 14 | A | 2 | WILEY | 26 |
| "ENERGY ECONOMICS" | 10 | A* | 3 | FRONTIERS MEDIA SA | 9 |
| "JOURNAL OF RISK AND FINANCIAL MANAGEMENT" | 9 | B | n/r | IEEE | 7 |
| "JOURNAL OF ALTERNATIVE INVESTMENTS | 6 | B | 2 | CAMBRIDGE UNIV PRESS | 4 |
| RESOURCES POLICY" | 6 | B | 2 | DESTECH PUBLICATIONS, INC | 4 |

Since the bulk of Green Bonds (264) research takes place in "China", there is a growing knowledge gap between China and the rest of the world in this area. These institutes are all situated in the "People's Republic of China". With 264 publications, "China", "England", and the "USA" ranked first, second, and third in Table 3, respectively, for writers linked with Green Bonds, correspondingly (58 articles).

**Table 3** Prominent authors and the institutions and nations with which they are related

| Authors | Record Count | C | Affiliations | Record Count | | Countries/ Regions | Record Count | TC |
|---|---|---|---|---|---|---|---|---|
| Taghizadeh-hesary F | 11 | 354 | UNIVERSITY OF LONDON | 28 | 123 | PEOPLES R CHINA | 258 | 1470 |
| UrichVolz | 10 | 51 | CENTRAL UNIVERSITY OF FINANCE ECONOMICS | 13 | 95 | ENGLAND | 68 | 439 |
| Jana Bohnke | 7 | 12 | HO CHI MINH CITY UNIVERSITY ECONOMICS | 13 | 142 | USA | 51 | 376 |
| Vanessa Eidt | 7 | 12 | CHINESE ACADEMY OF SCIENCES | 11 | 45 | FRANCE | 43 | 468 |
| Laura Knierim | 7 | 12 | GUANGZHOU UNIVERSITY | 11 | 62 | GERMANY | 38 | 297 |
| Managi S | 7 | 16 | LANZHOU UNIVERSITY | 11 | 19 | JAPAN | 36 | 619 |
| Naeem MA | 7 | 41 | TOKAI UNIVERSITY | 9 | 219 | PAKISTAN | 30 | 366 |

**iv. Statistical samples**

A number of approaches have been used in the study of green bonds. As a result, the 646 papers were manually classified into four study approaches: empirical, Theoretical / conceptual/ review/ meta-analysis, and

review (Brozovic, 2018). Conceptual studies aim to build a theoretical background based on theory or idea. In our context, empirical studies are those that use surveys to evaluate green bond pricing among the general public, study the causes, and experiment to quantify the impact of green financing. Review studies look back on earlier research, but meta-analysis analyses earlier studies with a new statistical framework brings together the findings.

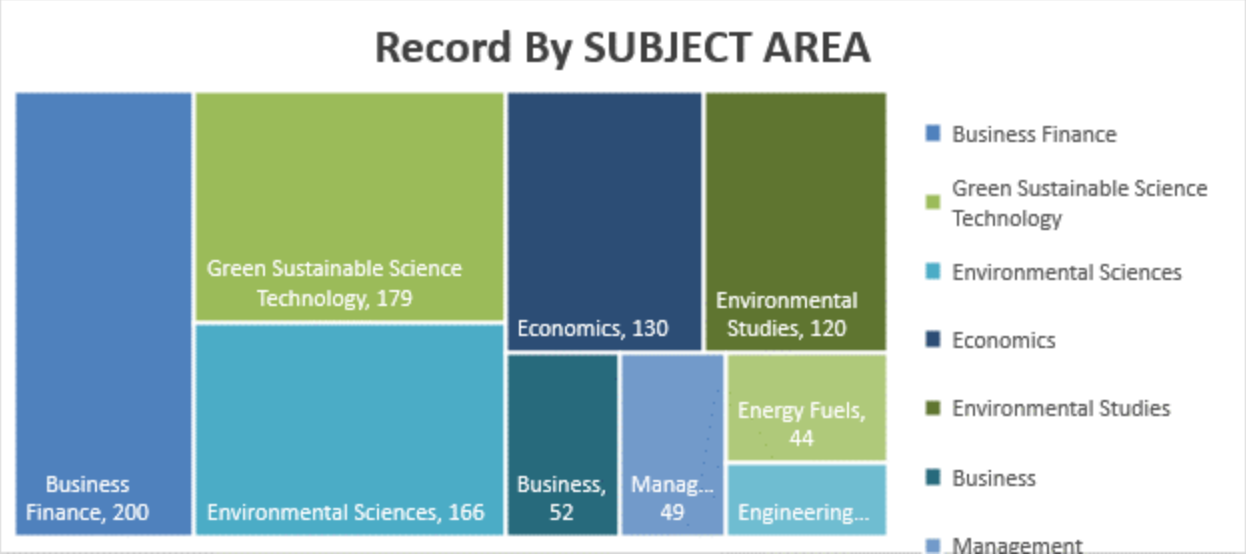


**Figure 5**646 articles covering the most recent records by Subject area of green bonds

In figure 5, A total of 200 of the 646 papers deal with corporate finance, which ties green bonds to performance and stock market reaction, allowing investors to gain an exhaustive considerate of the varied effects of green bond financing on shareholders, companies, and society as a whole. 179 publications are connected to the topic field Green sustainable science and technology, with an emphasis on how green bonds may assist developing nations achieve sustainable development or pertaining to the realm of understanding how various elements can aid improve sustainable development. There are 161 papers in the environmental sciences that describe the relationship between environment and green bonds, or research the influence of development on the environment, or suggest strategies to improve it. Apart from the aforementioned, 130 papers are connected to economics, 52 to business, and 49 to management.

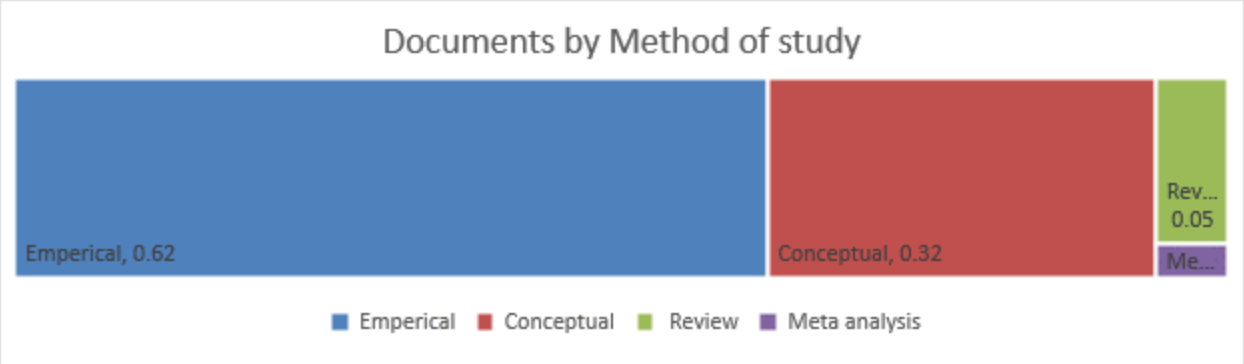


**Figure 6**defining documents on green bonds by method of study

Figure 6 depicts that in green financing research, 646 papers in the most predominant fields of Green bonds research. Only 6% are reviews or meta-analyses 32% of the 646 publications are conceptual. Few research, it may be deduced, give a thorough understanding of green bonds based on grounded ideas. The question of "What?" has been answered quite effectively, however there remains a gap in terms of addressing "Why?" using concepts and interpretations of current theories. The scarcity of review studies that provide up-to-

date information on green bonds is also apparent. There is also a scarcity of review studies that provide up-to-date information on green bonds.

Figure 7 shows that out of 646 studies, more than 39% were conducted by People R China which conclude to 257 of total record been published by single country, more than 10 % by England which are 68 in total and at third is USA with more than 7% which amounts to 51

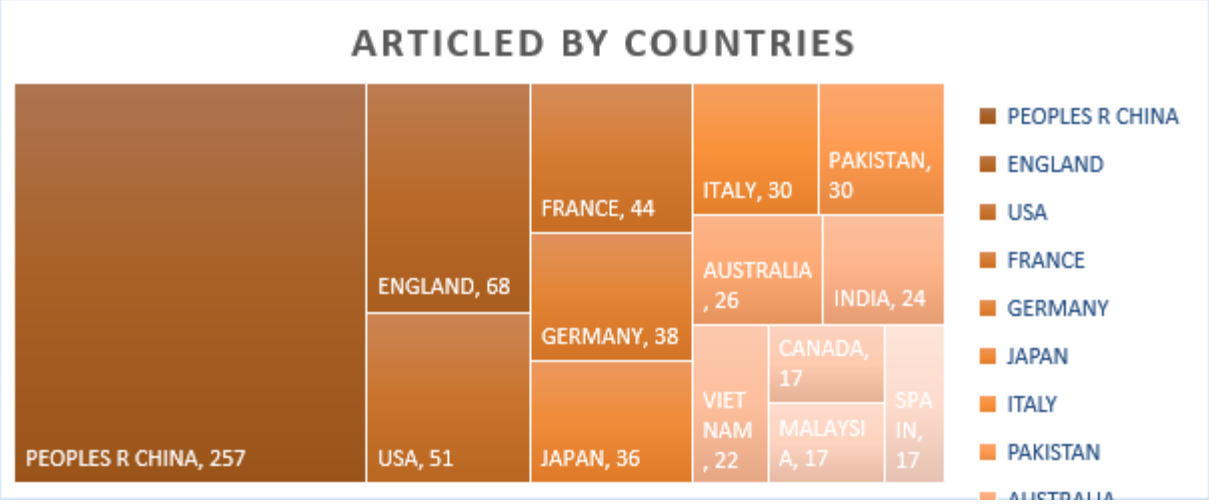


**Figure 7**defining the number of articles by countries.

records had been published and India has published only 24 document which is about 4% of total records reviewed, China is a developing nation that has done substantial research on Green Bonds, but developed countries have a greater interest since they are employing this instrument to fund development more sustainably. Developing nations have lately started employing these instruments, which has caused in a reduction in the amount of research papers. This is an issue that is just being started in the developing world. There is a lot of work that needs to be done in developing nations to improve policy efforts on Green bonds.

### c. Science Mapping

The science mapping analysis is a comprehensive approach that visually represents the existing knowledge in a specific research domain. It includes thematic analysis, and network analysis to provide a holistic understanding of the research landscape (Donthu et al., 2021). The Network analysis include the citation with network analysis using the Vos-viewer software to understand the citation count asper the authors contribution to the research (Tsay, 2009). The keyword analysis helps us understand which keyword is associate with the topic and also helps to demonstrate the need of working of topic with the other keyword associated with the topic and widespread its usage(Donthu et al., 2021)(Baker, Kumar, & Pandey, 2021). It also includes Co-authorship, which means when two authors collaborate on a research project and publish it in the same journal (Lu & Wolfram, 2012).

### i. Citation Network Analysis

The amount of citations a document has received over time is determined by its citation count. A paper that is more often mentioned is seen to be more influential and productive than one that is less frequently referred. The best way for mapping the impact of a research paper is to use citation analysis(Tsay, 2009).

**Table 4** show local and global citation of the top documents

| DOCUMENT | LOCAL CITATIONS | GLOBAL CITATION |
|---|---|---|
| ZERBIB (2019) | 115 | 337 |
| TANG (2020) | 58 | 232 |
| GIANFRATE (2019) | 49 | 174 |
| HACHENBERG (2018) | 60 | 172 |
| WANG (2016) | 78 | 167 |
| REBOREDO (2018) | 75 | 163 |
| BACHELET (2019) | 50 | 162 |
| TAGHIZADEH-HESARY (2019) | 94 | 154 |
| KARPF (2018) | 47 | 137 |
| FEBI (2018) | 48 | 126 |
| ZHANG (2019) | 67 | 117 |

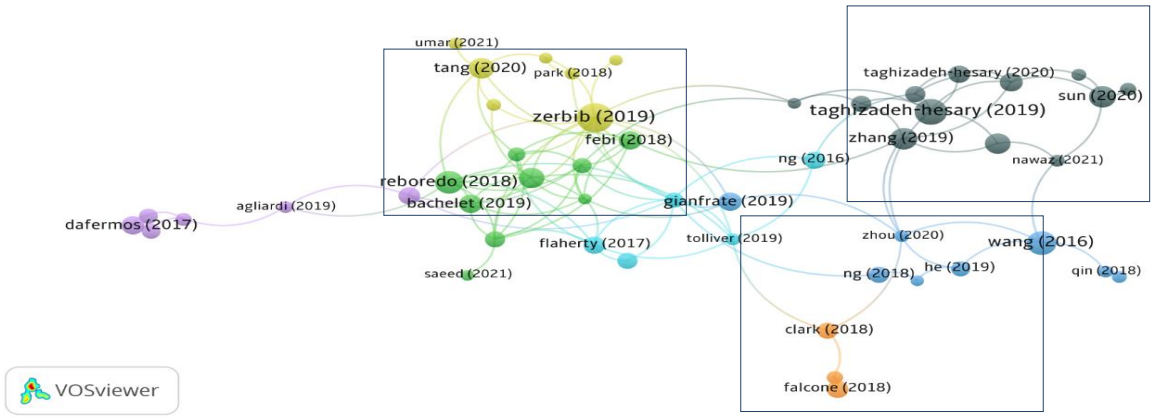


**Figure 8**Citation map on Green bonds.

(Note: **This graph depicts the citation network for green bonds using Vos Viewer with a minimum of 20 citations**).

With the help of VOS Viewer, the citation network of 646 articles on Green Bonds was analyzed. Table 4 lists the 15 most often referenced articles about Green Bonds in the USA and the rest of the world from 2007 to 2021. It is important to know how many times an article has been mentioned globally, which includes citations from inside and outside of a single database. Using the 646-node network, you can see how many times a publication has been referenced locally. Table 3 defines the list of authors with local and global citation Zerbib (2019) has the most worldwide citations, followed by tang (2020) and Gianfrate (2019) with 232 and 174 citations, respectively. Zerbib (2019) has the most local citations with 115. There are 94 citations for Taghizadeh-hesary (2019) in second place. One of the most influential publications on Green bonds is by zerbib (2019) and Tang (2020). A theoretical and exploratory model is provided to better understand the aspects that may aid the evolution of the green bond marketplace. A quick look at the facts on green bonds, their value to investors, and how they affect bond prices is also provided. As can be seen in Figure 8, the nodes with the greatest concentration of local citations are those that are the most prominent and thoroughly linked in the network. An article having a considerable number of citations from inside the field is regarded as a significant contribution to the field's body of knowledge. Zerbib (2019) as well as tang (2020) have made substantial contributions to this field, as is once again clear. This further implies that green sustainable development, green

advantage, green bond premium, and bond price, in addition to green bonds and green finance, are among the most prominent themes in green bond study. Other fields' interest in Green bonds may be seen in the apparent gap between global and local citations.

### ii. Keyword Analysis

The research publications' topics may be found in the authors text words (Comerio & Strozzi, 2019). In order to discover the most common strands of green bonds, a keyword analysis was carried out using the VOS Viewer. The 646 publications analyzed yielded a total of 2092 key words. Since 2007, green bonds research has been dominated by the usage of the following keywords: Table 5 depict keyword occurrences and their link strength With 166 occurrencesand a total link strength of 121, the keyword "Green Finance" is the most often utilised, indicating that this phrase alone is employed as a related idea in the works. The additional three maximum regularly used keywords are “Green Bonds” (152 occurrences with ink strength of 111), “Sustainable Development” (45 occurrences with in strength of 42) and “Climate Change” (38 occurrences with ink strength of 36). It is clear from the literature is that the green bonds is the subset of green finance which is specific financial instrument use to finance the sustainable development.

**Table 5** show the most occurred keywords used in the publications with link strength

| keyword | occurrences | total link strength |
|---|---|---|
| green finance | 166 | 121 |
| green bonds | 152 | 111 |
| sustainable development | 45 | 42 |
| climate change | 38 | 36 |
| sustainable finance | 31 | 28 |
| China | 26 | 23 |
| Sustainability | 23 | 23 |
| renewable energy | 19 | 16 |
| climate finance | 18 | 15 |
| green financing | 15 | 12 |
| green economy | 13 | 11 |
| financial development | 12 | 12 |
| corporate social responsibility | 10 | 10 |
| energy efficiency | 10 | 9 |
| ESG | 10 | 7 |

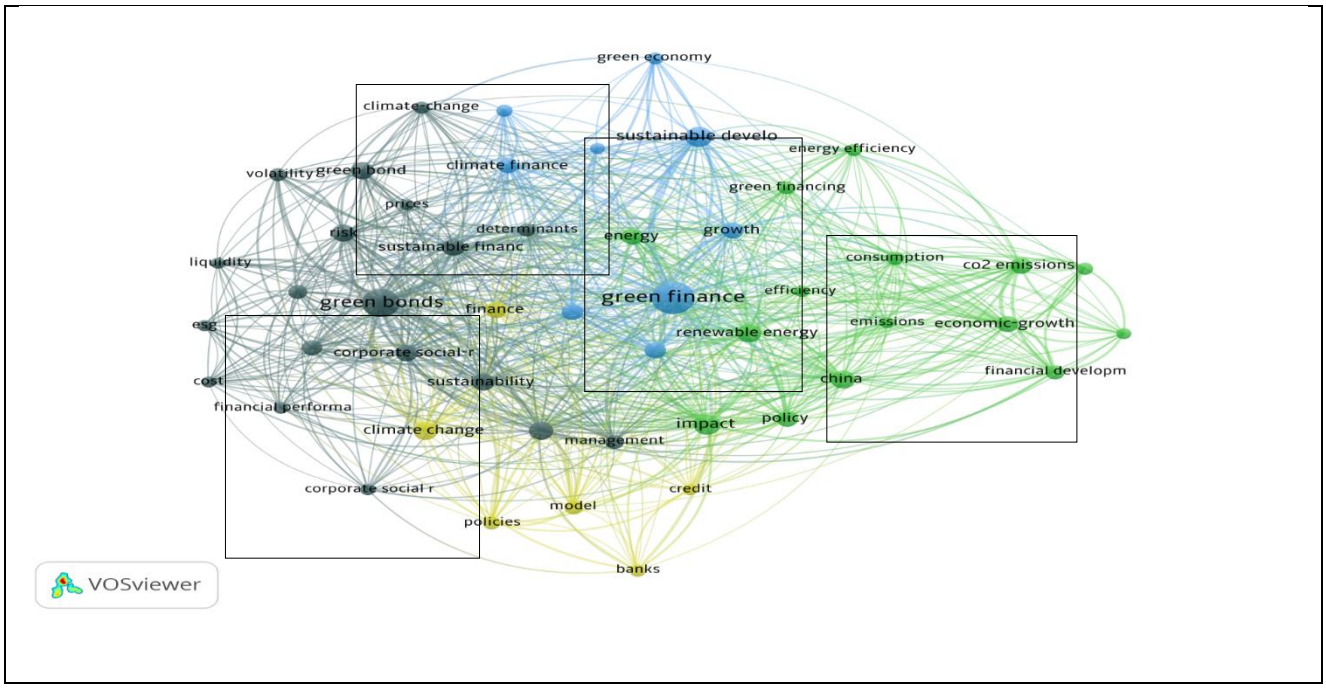


**Figure 9**Co-occurrence of keyword Network on Green bonds**.**
Note: Using Vos Viewer and a minimum of 10 keywords, this graph depicts the most frequently used keywords on green bonds. Bubbles with a bigger diameter have been employed more regularly.

Figure 9 illustrates that Green bonds is more extensively linked with the word climate, finance, climate change, policies, risk and volatility. Green bonds are linked with the financial and sustainable development, CSR, governance, etc. since the most of the research is done by china, so the green bonds have one of the more occurrence happened with china. Green bonds is one of the more core elements of financing the renewable energy market and lead to better performance and impact on the environment and economy. Green bonds and stock prices or green bonds and cost/ returns or green bonds and financial innovation / efficiency are the other emerging themes of the domain.

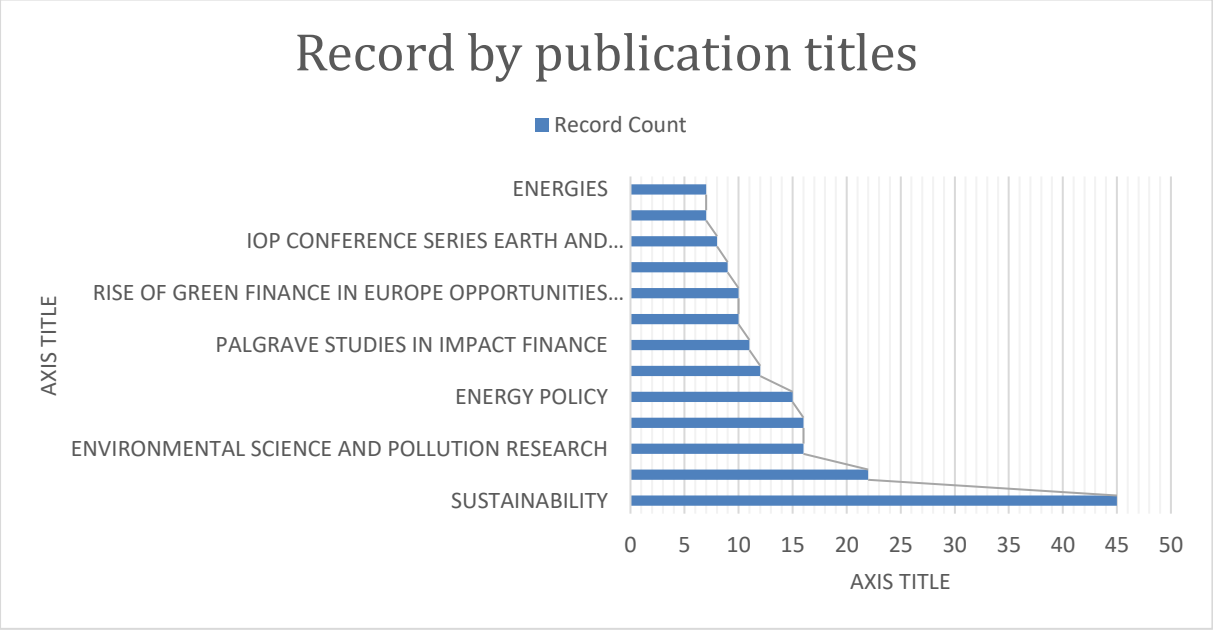


**Figure 10**records by publication titles

### iii. Co - Authorship Analysis

Co-authorship happens when two authors collaborate on a research project and publish it in the same journal (Lu & Wolfram, 2012)(Koseoglu, 2016). Oneof the most concrete and best settled sorts of logical collaboration. Pretty much every element of logical participation organizations can be dependably checked by analyzing co-origin networks by bibliometric strategies"(Bossart, 2010)(Koseoglu, 2016). These cooperation (co-authorship) networks exemplify research groups, factors influencing the co-creation, effect or creation of associations, and social design of the region by doing informal community examination (SNA) (Zupic & Čater, 2015). The subsequent system depends on the reason that co-origin frames an informal community of analysts (Moody, 2004), (Barabási et al., 2002). In late a long time there has been rising interest in the nature and size of logical participation. Concentrates on concentrating on co-origin have taken two particular methods. The first means to concentrate on the justifications for why authors coordinate and the repercussions of such decision (Laband & Tollison, 2000)

### iv. Countries analysis

Most numbers of co- authorship based on the countries is done with the china since they have the most number of documents with 213 documents, the authors of china collaborated with the authors of Australia, Bangladesh, England, India, etc. as shown in table 6, which belongs to the second cluster having 10 countries.

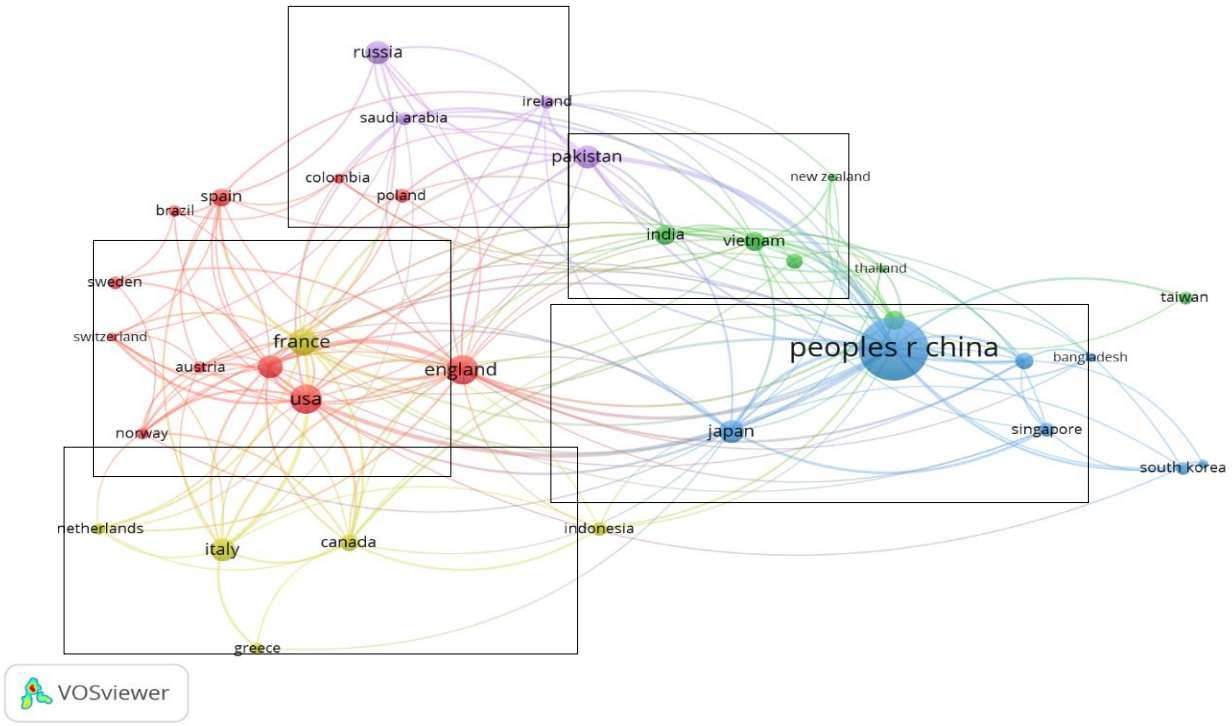


**Figure 11**map of co authorships of countries

Note: Using Vos Viewer and a minimum of 10 citations with atleast 4 documents, this graph depicts the most frequently co-authored countries on green bonds

The second most number of collaboration done with the England having 48 documents which also belongs to second cluster. The third and fourth highest number of document is published by USA and France respectively with 45 and 40 documents. The author of USA collaborated with Austria, Japan, Columbia, Germany, Norway etc. as they belong to first cluster. The author of France collaborated with Greece, Indonesia, and Italy etc. It also shows that the authors of these few countries only collaborated with these countries within clusters. This can be clearly seen with help of network figure 11.

**Table 6** clusters analysis of co authorships of countries with no of documents and citations

| Country | documents | citation | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Cluster 5 |
|---|---|---|---|---|---|---|---|
| Peoples R China | 213 | 1236 | Austria | Australia | Canada | Ireland | Japan |
| England | 48 | 382 | Japan | Bangladesh | France | Pakistan | Singapore |
| USA | 45 | 346 | Columbia | England | Greece | Russia | Philippines |
| France | 40 | 452 | Germany | India | Indonesia | Saudi Arabia | South Korea |
| Germany | 30 | 274 | Norway | Malaysia | Italy | | |
| Russia | 30 | 54 | Poland | China | Netherlands | | |
| Italy | 28 | 356 | Spain | Romania | | | |
| Japan | 28 | 556 | Sweden | Taiwan | | | |
| Pakistan | 28 | 271 | Switzerland | Vietnam | | | |
| Vietnam | 21 | 254 | USA | | | | |
| Australia | 20 | 141 | 10 | 9 | 6 | 4 | 4 |
| India | 20 | 272 | | | | | |
| Spain | 19 | 278 | | | | | |
| Malaysia | 16 | 136 | | | | | |
| Canada | 15 | 141 | | | | | |

Full-length publications were only viewed if the abstracts were in question regarding their significance. An extensive search for relevant papers yielded a long list of topics such as "socially responsible investment," "green bonds," and other closely similar terms. These topics were narrowed down to a manageable number of subtopics for the final analysis. As a consequence, there were no more duplications and then we are left with 646 articles. After scrutinizing through 646 articles, we've come to the conclusion that 127 articles were subjected to a content analysis, yielding 127 clusters of articles for further examination (n = 127). According to ABDC's journal rankings (n = 30), only high-quality publications were considered for additional gist exploration in order to concentrate on first-class papers out of 127 articles published that explain how green bonds function (Hao, Paul, Trott, Guo, & Wu, 2021). All the steps involved in obtaining information are shown in Figure 1**.**

**d. Content analysis**

It is believed that Content analysis is based on the texts contain valuable information and can serve as a rich data source for gaining insights into specific phenomena(Kondracki et al., 2002)(Kleinheksel et al., 2020).Content analysis is a method utilized to make unbiased conclusions about a specific subject within various forms of communication. It involves categorizing raw messages, such as text, images, and illustrations, based on a predefined classification system. The coding process facilitates the organization of communication content, enabling the easy identification, indexing, and retrieval of relevant information for research purposes(Sutton & Austin, 2015)(Kondracki et al., 2002). In this we use cluster analysis to find out the themes of research going on in the field of green bonds and helps to understand where the research development is going for in the future, which will hlp the researcher to findout the relationship currently and where to go from here (Saheb, Jamthe, & Saheb, 2022).

**i.Cluster Analysis**

In bibliometric and scientometric research, network analysis is commonly used to examine networks of journals, authors, keywords, or documents. Techniques of mapping and clustering are employed to understand the network structure and address questions like to use a scientific domain to find the main topics or research fields within, their relationships, and the domain's development over time(Waltman et al., 2010). Onthe basis of co-occurrence analysis using Vos viewer, the map based on the authors' keywords are prepared. Themes are then analyzed using thoroughly scanning the cluster and its relationship with the green bonds over period of its

emergence(Saheb et al., 2022). A cluster content analysis was performed on six identified clusters from the co-occurrence analysis of keywords(Saheb et al., 2022). The table 7 show that the green bond have 6 cluster. On the basis which the themes has been categorized.

**Table 7** clusters of most frequent keywords used together

| **Cluster 1 GREEN** | **Cluster 2 PURPLE** | **Cluster 3 SKY BLUE** | **Cluster 4 GREY** | **Cluster 5 PURPLE** | **Cluster 6 BROWN** |
|---|---|---|---|---|---|
| Climate change mitigation | Climate change | Covid | Financial innovation | Green bonds | Bond yield |
| Energy efficiency | Climate finance | Esg | Green bond market | Green economy | Green premium |
| Green financing | Green bonds premium | Sustainability | Sustainable investing | Liquidity | Investor attention |
| Renewable Energy | Impact investing | | | bond price | Sustainable finance |

This study will help us understanding the themes under which previous studies falls and the interconnectivity with the other cluster. Foremost it will helps to understand future line of action required to be taken to further the research on the green bonds and which can be done with analysis

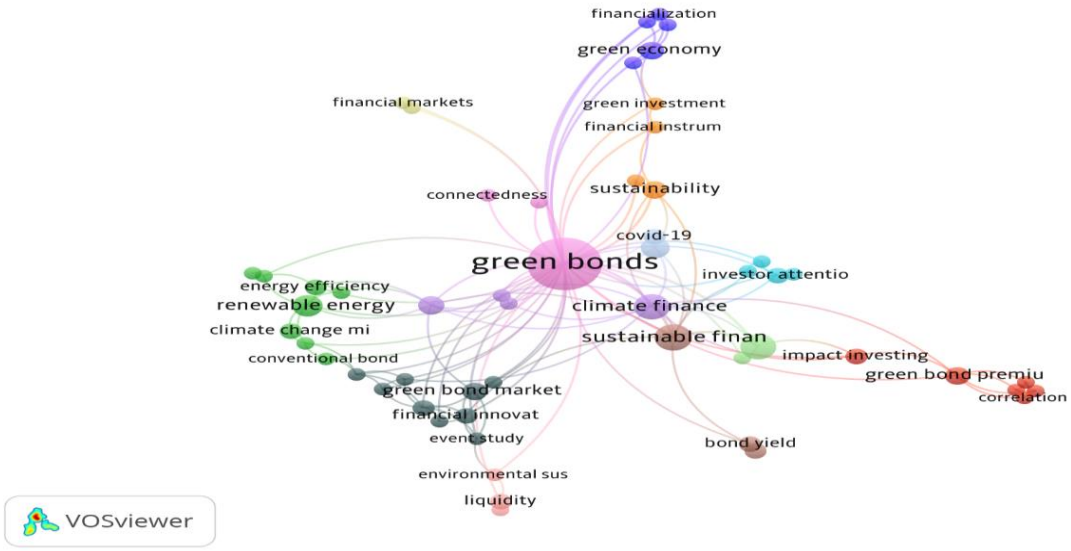


**Figure 12**showing the map of keyword based on 127 papers selected from 2016-2022

**Cluster 1- relationship between the green bonds, sustainability and climate change**

Under this cluster, association of green bonds, sustainability and climate change is the focal point of this theme. This cluster is concerned with the research in the field of green bonds which describe the benefit of green bonds in development of economy without giving negative impact on the environment as it help to achieve sustainable development. Green bonds are such instruments which contribute not only toward the environment by financing the sustainable projects(Monk & Perkins, 2020) but also toward the financial performance of the company (Agliardi & Agliardi, 2019b). There is need to reduce the carbon emission and help to reduce the impact of climate change for such reason there is need of private finance instrument that help to achieve that(McInerney & Johannsdottir, 2016). The green bonds can help to finance those projects which otherwise can be very difficult to finance, hence can be help to reduce the negative impact of the

development(Kuna-Marszalek & Marszalek, 2017),(Malorgio, Teti, & Dallocchio, 2021). Since the renewable energy is the one of the most important requirement to tackle the increasing energy need of the world but the financing is the constraint that was not able to utilize the benefit of renewable energy to the fullest, which can be achieved with the help of green bonds (Kandir & Yakar, 2017). Green bonds helps the economy to transition from less sustainable based model to more sustainable based model (Daszynska-Zygadlo, Marszalek, & Piontek, 2018). Due to the existential threat looming over the world and heavy cost related to the climate change,

**Table 8** showing the themes based on the clusters of keywords

| **Cluster 1** | **Cluster 2** | **Cluster 3** |
|---|---|---|
| Relationship between green bonds sustainability and climate change financing | Relationship between green bonds and determinants (individually) | Relationship between green bonds, conventional bonds |
| (Agliardi & Agliardi, 2019b) | (Reed, Cort, & Yonavjak, 2019 | (Hyun et al., 2021) |
| (McInerney & Johannsdottir, 2016) | (R. Zhang et al., 2021) | (Naeem, Farid, et al., 2021) |
| (Kuna-Marszalek & Marszalek, 2017) | (Linh Pham & Luu Duc Huynh, 2020) | (Zerbib, 2019) |
| (Kandir & Yakar, 2017) | (Chang et al., 2021) | (Hung, 2021a) |
| (Daszynska-Zygadlo et al., 2018) | (Febi et al., 2018) | (Jin, Han, Wu, & Zeng, 2020) |
| (Malorgio et al., 2021) | (Dorfleitner, Utz, & Zhang, 2021) | (Daszynska-Zygadlo et al., 2018) |
| (S. K. Park, 2018) | (Siswantoro, 2018) | (Draksaite et al., 2018) |
| (Mihalovits & Tapaszti, 2018) | (Draksaite et al., 2018) | (Alonso-Conde & Rojo-Suarez, 2020) |
| (Wiśniewski & Zieliński, 2019) | (Daszynska-Zygadlo et al., 2018) | (Febi et al., 2018) |
| (Apetri & Mihalciuc, 2019) | (Chang et al., 2021) | (Zhou, Zhang, & Polochova, 2021) |
| (Monk & Perkins, 2020) | (Löffler, Petreski, & Stephan, 2021) | (Reboredo, 2018) |
| (Hoinaru, Benson, Stanila, Dobre, & Buda, 2020) | (Dan & Tiron-Tudor, 2021) | (D. Park et al., 2020) |
| (Deschryver & de Mariz, 2020) | (Piñeiro-Chousa, et al.,2021) | (Kanamura, 2020) |
| (McInerney & Bunn, 2019) | (Dragon Yongjun Tang & Zhang, 2020) | (Dorfleitner et al., 2021) |

green bonds likely to play integral part to overcoming the situation (S. K. Park, 2018). The green bonds is recognize by both the participant and regulators and society(Hoinaru et al., 2020) as the instruments for sustainable development for financing of projects(Mihalovits & Tapaszti, 2018). The green nature of green bonds attracts the more investors as it lead to more investment in the sustainable projects(Wisniewski & Zielinski, 2019). The green bonds considered to be the most developed form of financing the sustainable projects (Apetri & Mihalciuc, 2019), (McInerney & Bunn, 2019). Green bonds considered as instrument that provide both financial returns as well as social change by financing projects (Deschryver & de Mariz, 2020). As one of the most innovating financial instrument, green bonds play unprecedented role in directing private finance towards low carbon investment(Banga, 2019).

**Cluster 2 relationship between green bonds and conventional bonds and its determinants**

Under this bunch the point of convergence is the relationship of green bonds with the different regular bonds or instruments or monetary resources. The focus of these paper to analyze the relation green bonds have with the other instruments in term of yield, price, financial performance and share price etc. The green bonds, in comparison to conventional bonds issued at larger size and but not offers better yield than the counterpart, it is due the facts that either most of green bonds are issued without credit rating or lower underlying risk (Löffler et al., 2021), (Chang et al., 2021). The size and maturity of bonds likely to affect the efficiency of the bonds as the

green bonds are less efficient than its counterpart as it has smaller size and maturity but the green bonds attracts the those investors that supports the pro environmental preferences and choose greener economy (Naeem, Farid, et al., 2021). The green bonds less likely to affected by the economic uncertainty as it prices remains more stable than its counterpart (Naeem, Farid, et al., 2021). Its suggested that the green bonds shows low yield(Hyun et al., 2021) i.e. negative premium than its counterpart as pro environmental preference has low impacts on the price of green bonds(Zerbib, 2019). It suggested that there is low time dimensional variation in comparison with other financial asset (Hung, 2021a). Green bonds offers better internal rate of return to the stakeholders than the bank loans but higher debt coverage ratio than the counterpart (Alonso-Conde & Rojo-Suarez, 2020). The green bond index can be used as the hedging tool to hedge the carbon future and does not fade even during the period of economic crisis (Jin et al., 2020). The green bonds liquidity are comparatively more than the conventional bonds but the yield over the period of time show negligible difference equated to the non-green bonds (Febi et al., 2018). The extreme economic condition tends to make lesser effect on green bonds as it provides better instrument for diversifying the market risk as it becomes negatively correlated with the conventional bonds and vice versa (Zhou et al., 2021) but shows no diversification effect on corporate and treasury bond market (Reboredo, 2018). Despite the fact that there are some instability overflow impacts between the green security and values markets, none responds strongly to negative shocks in the other market, according to an examination of the relationship between the two markets (D. Park et al., 2020).We also show that green bond premium anticipated returns are positive although declining, and that green bond premium risks are somewhat lowering(Dorfleitner et al., 2021) yet, practically level after some time lately, bringing about sure yet falling data proportions which implies that green bond venture execution is superior to customary bond speculation execution, yet that the benefit is reducing with time(Kanamura, 2020).

**Cluster 3 relationship between green bonds and determinants**

Under this cluster the focal point is the association of green bonds and factors/ determinants of green bonds that affects the investor's decision to choose green bonds over the other bonds. These paper study the various antecedents of green bonds that likely to influence the investor to choose green bonds over the other types of bonds. Credit rating seems to be the factor as it affects the green bonds price as it also reduces the risk of debt instrument(Loffler et al., 2021). Cost of capital of company can be reduce as issuance of green bonds helps to improve proper information symmetry, reduces perceived risk and improve stock liquidity, hence these can induce green bonds issuance(R. Zhang et al., 2021). External review can significantly affects the green bonds acceptance as it improves the confidence of investors (Dan & Tiron-Tudor, 2021) as Investors acknowledge charges for bonds with a huge natural goal, which develops with outer greenness appraisals. This external corroboration impact, which is largest for dark-green bonds, may compensate for the lack of information outlays, as the consequence diminishes with bond age(Dorfleitner et al., 2021). Green bond issuance is associated with the ESG in a favorable and meaningful way. Green bonds are a technique to fund projects that will minimize risk and have a higher ESG risk score. Investors' focus has shifted to non-financial factors that might affect the issuer's results (Dan & Tiron-Tudor, 2021). The liquidity of green security altogether influence the securities yield and the yield spreads of green corporate securities with shifting issuance terms are more impacted by liquidity (Dragon Yongjun Tang & Zhang, 2020) and credit rating discrepancies(Chang et al., 2021). Social media is one of the ,most influential factor affecting green bonds issuance and acceptance, the one Tweets clearly have a favorable influence on green bond returns, reflecting the public's good opinion about green bonds. When it comes to making meaningful investing decisions, investors and traders can compare tweets and postings on similar social media sites to official market news snippets (Juan Piñeiro-Chousa et al., 2021). Investor attention has an impact on green bond returns and volatility, but that this link changes with time (Linh Pham & Luu Duc Huynh, 2020). Green bonds certification certainly affects the market by influencing the investors' attention (Reed, Cort, & Yonavjak, 2019) and also significantly improve the demand of green bond (Linh Pham & Luu Duc Huynh, 2020). The cost of getting, monitoring and reporting the green label should be decreased, and openness on green initiatives should be improve the creditworthiness of issuer. These safeguards may be particularly important in developing economies, where the development of debt market have not sufficiently to effectively leverage this novel instrument(Agliardi & Agliardi, 2019b).

**ii.** Discussion and analysis of gap in literature

Green bonds means green growth, as it require the green objective on the part of the companies/ issuers in order for this instrument to collect money from the market and also explain and earmark the proceed for the which purpose they are going to spent the proceeds on the any projects(Noh, 2018). But since the emergence of first green bonds issuance in 2007, there is still very slow development of publication in this topic as there are still few quality review papers available in this field. Hence the research in this field required to be improved as this is one of the most innovative debt financing instrument which finance the emerging green projects and also play very important role in directing the private finance towards the low carbon investment (Banga, 2019). This report will enable future research on the different gaps available in the writing by checking the elements influencing the issuance and rise of green bonds.

With only a few countries doing the most work in this field (China and England), other countries can collaborate with these top countries on green bond research. This collaboration allows for a closer look at the green bonds traded on the various stock exchanges across the world. Likewise, the University of London and Ho Chi Minh City University of Economics are the world's most examined universities, with the most citations on their papers. In addition to creating and publishing a better research paper, working with these affiliates will assist your paper be internationally recognized.

Green bond study is multidisciplinary, encompassing corporate finance, green sustainable science technology, environmental science, and economics, management, and energy fuels. The subject area with the most papers published is corporate finance, with over 200 articles, followed by green sustainable science technology with over 170 papers. However, little research has been done on how green bonds affect business operations, whether short-term or long-term, or how investors feel about green bonds versus conventional corporate bonds.

In India, the green bond market is still in its infancy, with Yes Bank issuing its first green bond in 2015. As one of the growing countries, India has very few papers published. India is one of the 15 countries that issue green bonds. This advancement must be reciprocated in terms of research in the same field. By 2044, India will out invest the US in green projects (2019).

Using text analysis, we discovered the numerous themes on which green bond research has been conducted over time. The most popular research topics are the green bond and sustainable development, or the green bond and private finance, and their impact on economic growth. Secondly, research has compared green bonds to non-conventional bonds, financial assets, or shares, comparing the issue price, yield, and the impact of credit rating on improving the transparency of green bonds and its effect on issue size. However, there are still areas that need to be properly explored, such as how investor sentiments in green bonds compare to non-conventional bonds, financial assets, or shares. So, since no or little research has been done in these areas, future researchers can explore them.

One thing is certain: the green bond has enough conceptual paper to assist future researchers completely grasp the concept and working of green bonds, as well as their emergence and evolution over time. Despite the abundance of conceptual works, there are few quality reviews or bibliometric publications accessible on this topic. So this work will not only aid future researchers in their studies of all the prominent area in the field of green bonds but it has the information which the other research paper lacks that to provide all combined information (based on literature) on factors that not only considered important in the issuance or emergence of bonds but also allowed the green bonds to be used in wide variety of ways and will ultimately help in achieving the sustainability(Savaya et al., 2009).

## 6. Conclusion

This review is the first of its type to provide the complete view of studying various factors that considered to affect the green bonds on the basis of paper published on individual factors studied by the previous researchers but also provide an overview of green bond market research through a systematic literature review withbibliometric analysis. It offers valuable insights into the field of green bond research. The review uncovers interesting findings through extensive use of bibliometric analysis, including prolific authors, influential articles, top contributing countries, sources and affiliations. Additionally, it examines major topics and themes using network analysis and temporal of green bond research, resulting in summarized key benefits and their future implications. This paper also provide the valuable insight on the various factors that are

considered for the green bond market expansion, due to its widespread use which had not been discussed before. This essentially will allow the future researcher to conduct the further research to enhance the sustainability of the bonds.

This piece of work aims to thoroughly review the existing literature on green bonds, resulting in valuable insights. In our daily economic decisions, this kind of literacy is becoming increasingly important. Scholarly research shows that people in developed and developing countries alike lack strong ties to the natural world. As a reminder for policymakers and different partners, this review ought to be a focal point of consideration for those attempting to work on green securities and at last secure long haul financing for significant cultural drives. Theoretical advancement, context coverage, and methodology advancement are all areas where new ideas can be introduced. Environmental health, financial health, and the development of a competitive and green economy can all be influenced by green bonds.

## 7. Limitation of Study

This review makes valuable contributions to the research on green bonds. However, the limitations should be noted. Firstly, the research examined articles from the Scopus database, which may not include the entire body of relevant literature. Secondly, the review focused only on articles in the English language, potentially excluding important research in other languages. While this review provides an overview of green bond market research, it does not extensively cover the discussion of green bonds at the country level. Therefore, future research should consider exploring green bond markets in developing countries to advance a completeinsight of the key drivers and their impact on various stakeholders in achieving a green economy.

## Bibliography

[1] Agliardi, E., & Agliardi, R. (2019a). Financing environmentally-sustainable projects with green bonds. *ENVIRONMENT AND DEVELOPMENT ECONOMICS*, *24*(6, SI), 608–623. https://doi.org/10.1017/S1355770X19000020

[2] Agliardi, E., & Agliardi, R. (2019b). Financing environmentally-sustainable projects with green bonds. *Environment and Development Economics*, *24*(6), 608–623. https://doi.org/10.1017/S1355770X19000020

[3] Alonso-Conde, A.-B., & Rojo-Suarez, J. (2020). On the Effect of Green Bonds on the Profitability and Credit Quality of Project Financing. *SUSTAINABILITY*, *12*(16). https://doi.org/10.3390/su12166695

[4] Apetri, A. N., & Mihalciuc, C. C. (2019). GREEN BONDS - FORM OF ECOLOGICAL PROJECTS FUNDING. In Dinu, V (Ed.), *2019 BASIQ INTERNATIONAL CONFERENCE: NEW TRENDS IN SUSTAINABLE BUSINESS AND CONSUMPTION* (pp. 460–465). PIATA ROMANA NR 6, SECTOR 1, BUCURESTI, 701631, ROMANIA: EDITURA ASE.

[5] Argandoña, L. C. B., Rambaud, S. C., & Pascual, J. L. (2022). The Impact of Sustainable Bond Issuances in the Economic Growth of the Latin American and Caribbean Countries. *Sustainability (Switzerland)*, *14*(8), 1–19. https://doi.org/10.3390/su14084693

[6] Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*, *1*(1), 377–386. https://doi.org/10.1162/qss_a_00019

[7] Bachelet, M. J., Becchetti, L., & Manfredonia, S. (2019). The Green Bonds Premium Puzzle : The Role of Issuer Characteristics and Third-Party Verification. *Sustainability*, 1–22. https://doi.org/10.3390/su11041098

[8] Bagnoli, M., & Watts, S. G. (2020). On the corporate use of green bonds. *JOURNAL OF ECONOMICS & MANAGEMENT STRATEGY*, *29*(1), 187–209. https://doi.org/10.1111/jems.12331

[9] Baker, H. K., Kumar, S., & Pandey, N. (2021). Forty years of the Journal of Futures Markets: A bibliometric overview. *Journal of Futures Markets*, *41*(7), 1027–1054. https://doi.org/10.1002/fut.22211

[10] Banga, J. (2018). The green bond market : a potential source of climate finance for developing countries. *Journal of Sustainable Finance & Investment*, *0*(0), 1–16. https://doi.org/10.1080/20430795.2018.1498617

[11] Banga, J. (2019). The green bond market: a potential source of climate finance for developing countries. *Journal of Sustainable Finance and Investment*, *9*(1), 17–32. https://doi.org/10.1080/20430795.2018.1498617

[12] Barabási, A. L., Jeong, H., Néda, Z., Ravasz, E., Schubert, A., & Vicsek, T. (2002). Evolution of the social network of scientific collaborations. *Physica A: Statistical Mechanics and Its Applications*, *311*(3), 590–614. https://doi.org/https://doi.org/10.1016/S0378-4371(02)00736-7

[13] Barua, S, & Chiesa, M. (2019). Sustainable financing practices through green bonds: What affects the funding size? *Business Strategy and the Environment*, *28*(6), 1131–1147. https://doi.org/10.1002/bse.2307

[14] Barua, Suborna, & Chiesa, M. (2019). Sustainable financing practices through green bonds: What affects the funding size? *BUSINESS STRATEGY AND THE ENVIRONMENT*, *28*(6), 1131–1147. https://doi.org/10.1002/bse.2307

[15] Baulkaran, V. (2019). Stock market reaction to green bond issuance. *Journal of Asset Management*, *20*(5), 331–340. https://doi.org/10.1057/s41260-018-00105-1

[16] Bhutta, U. S., Tariq, A., Farrukh, M., Raza, A., & Iqbal, M. K. (2022). Green bonds for sustainable development: Review of literature on development and impact of green bonds. *Technological Forecasting and Social Change*, *175*, 121378. https://doi.org/https://doi.org/10.1016/j.techfore.2021.121378

[17] Blanco-Mesa, F., Merigó, J. M., & Gil-Lafuente, A. M. (2017). Fuzzy decision making: A bibliometric-based review. *Journal of Intelligent and Fuzzy Systems*, *32*(3), 2033–2050. https://doi.org/10.3233/JIFS-161640

[18] Bossart, J. (2010). *Opening the black box*. *Pharmaceutical Manufacturing and Packing Sourcer*. https://doi.org/10.5860/crl.77.5.564

[19] Bužinskė, J., & Stankevičienė, J. (2023). Analysis of Success Factors, Benefits, and Challenges of Issuing Green Bonds in Lithuania. *Economies*, *11*(5). https://doi.org/10.3390/economies11050143

[20] Cao, X., Jin, C., & Ma, W. (2021). Motivation of Chinese commercial banks to issue green bonds: Financing costs or regulatory arbitrage? *CHINA ECONOMIC REVIEW*, *66*. https://doi.org/10.1016/j.chieco.2020.101582

[21] CBI. (2016). Green Bond Labels and Standards Topics covered in this webinar, (June). Retrieved from https://www.climatebonds.net/files/files/Green Bond Labels and Standards 10-06-2016.pdf

[22] Chang, K., Feng, Y. L., Liu, W., Lu, N., & Li, S. Z. (2021). The impacts of liquidity measures and credit rating on corporate bond yield spreads: evidence from China's green bond market. *Applied Economics Letters*, *28*(17), 1446–1457. https://doi.org/10.1080/13504851.2020.1824062

[23] Cheng, L. T. W., Sharma, P., & Broadstock, D. C. (2023). Interactive effects of brand reputation and ESG on green bond issues: A sustainable development perspective. *Business Strategy and the Environment*, *32*(1), 570–586. https://doi.org/https://doi.org/10.1002/bse.3161

[24] Chiesa, M., & Barua, S. (2019). The surge of impact borrowing: the magnitude and determinants of green bond supply and its heterogeneity across markets. *Journal of Sustainable Finance and Investment*, *9*(2), 138–161. https://doi.org/10.1080/20430795.2018.1550993

[25] Comerio, N., & Strozzi, F. (2019). Tourism and its economic impact: A literature review using bibliometric tools. *Tourism Economics*, *25*(1), 109–131. https://doi.org/10.1177/1354816618793762

[26] Cotton, D. (2020). Transition finance and markets. *ACRN Journal of Finance and Risk Perspectives*, *9*(1), 137–147. https://doi.org/10.35944/JOFRP.2020.9.1.011

[27] Dabić, M., Vlačić, B., Paul, J., Dana, L.-P., Sahasranamam, S., & Glinka, B. (2020). Immigrant entrepreneurship: A review and research agenda. *Journal of Business Research*, *113*, 25–38. https://doi.org/10.1016/j.jbusres.2020.03.013

[28] Dan, A., & Tiron-Tudor, A. (2021). The Determinants of Green Bond Issuance in the European Union. *Journal of Risk and Financial Management*, *14*(9), 446. https://doi.org/10.3390/jrfm14090446

[29] Daszynska-Zygadlo, K., Marszalek, J., & Piontek, K. (2018). Sustainable Finance Instruments' Risk - Green Bond Market Analysis. In Nesleha, J and Hampl, F and Svoboda, M (Ed.), *EUROPEAN FINANCIAL SYSTEMS 2018: PROCEEDINGS OF THE 15TH INTERNATIONAL SCIENTIFIC*

*CONFERENCE* (pp. 78–85). ZEROTINOVO NAM 617-9, BRNO 601 77, CZECH REPUBLIC: MASARYKOVA UNIV.

[30] Deschryver, P., & de Mariz, F. (2020). What Future for the Green Bond Market? How Can Policymakers, Companies, and Investors Unlock the Potential of the Green Bond Market? *Journal of Risk and Financial Management*, *13*(3), 61. https://doi.org/10.3390/jrfm13030061

[31] Doi, L., Caputo, A., Marzi, G., Pellegrini, M. M., & Rialti, R. (2018). Riccardo Rialti is a Ph.D. Student in Management and Business Administration from the University of Florence (IT). His main research interest is entrepreneurship, specifically how entrepreneurial characteristics relate to firm image and performance. Furth.

[32] Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*(May), 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

[33] Dorfleitner, G., Utz, S., & Zhang, R. (2021). The pricing of green bonds: external reviews and the shades of green. *Review of Managerial Science*. https://doi.org/10.1007/s11846-021-00458-9

[34] Dou, X., & Qi, S. (2019). The choice of green bond financing instruments. *Cogent Business and Management*, *6*(1). https://doi.org/10.1080/23311975.2019.1652227

[35] Draksaite, A., Kazlauskiene, V., & Melnyk, L. (2018). The Perspective of the Green Bonds as Novel Debt Instruments in Sustainable Economy. In Bilgin, MH and Danis, H and Demir, E and Can, U (Ed.), *CONSUMER BEHAVIOR, ORGANIZATIONAL STRATEGY AND FINANCIAL ECONOMICS* (Vol. 9, pp. 221–230). GEWERBESTRASSE 11, CHAM, CH-6330, SWITZERLAND: SPRINGER INTERNATIONAL PUBLISHING AG. https://doi.org/10.1007/978-3-319-76288-3_16

[36] Fatica, S., & Panzica, R. (2021). Green bonds as a tool against climate change? *Business Strategy and the Environment*, *30*(5), 2688–2701. https://doi.org/10.1002/bse.2771

[37] Febi, W., Schäfer, D., Stephan, A., & Sun, C. (2018). The impact of liquidity risk on the yield spread of green bonds. *Finance Research Letters*, *27*, 53–59. https://doi.org/10.1016/j.frl.2018.02.025

[38] Flaherty, M., Gevorkyan, A., Radpour, S., & Semmler, W. (2017). Financing climate policies through climate bonds – A three stage model and empirics. *Research in International Business and Finance*, *42*, 468–479. https://doi.org/10.1016/j.ribaf.2016.06.001

[39] Gianfrate, G., & Peri, M. (2019). The green advantage: Exploring the convenience of issuing green bonds. *Journal of Cleaner Production*, *219*, 127–135. https://doi.org/10.1016/j.jclepro.2019.02.022

[40] Gilal, F. G., Zhang, J., Paul, J., & Gilal, N. G. (2019). The role of self-determination theory in marketing science: An integrative review and agenda for research. *European Management Journal*, *37*(1), 29–44. https://doi.org/10.1016/j.emj.2018.10.004

[41] Goyal, K., & Kumar, S. (2021). Financial literacy: A systematic review and bibliometric analysis. *International Journal of Consumer Studies*, *45*(1), 80–105. https://doi.org/https://doi.org/10.1111/ijcs.12605

[42] Hachenberg, B., & Schiereck, D. (2018). Are green bonds priced differently from conventional bonds? *Journal of Asset Management*, *19*(6), 371–383. https://doi.org/10.1057/s41260-018-0088-5

[43] Hacıömeroğlu, H. A., Danışoğlu, S., & Güner, Z. N. (2022). For the love of the environment: An analysis of Green versus Brown bonds during the COVID-19 pandemic. *Finance Research Letters*, *47*(November 2021). https://doi.org/10.1016/j.frl.2021.102576

[44] Hao, A. W., Paul, J., Trott, S., Guo, C., & Wu, H. H. (2021). Two decades of research on nation branding: a review and future research agenda. *International Marketing Review*, *38*(1), 46–69. https://doi.org/10.1108/IMR-01-2019-0028

[45] Hoinaru, R., Benson, C., Stanila, G. O., Dobre, F., & Buda, D. (2020). Green Bonds: Between economic incentives and eco-change. *PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON BUSINESS EXCELLENCE*, *14*(1), 236–245. https://doi.org/10.2478/picbe-2020-0022

[46] Hung, N. T. (2021a). Green Bonds and Asset Classes: New Evidence from Time-varying Copula and Transfer Entropy Models. *Global Business Review*, 097215092110340. https://doi.org/10.1177/09721509211034095

[47] Hung, N. T. (2021b). Nexus between green bonds, financial, and environmental indicators.

*ECONOMICS AND BUSINESS LETTERS*, *10*(3, SI), 191–199. https://doi.org/10.17811/ebl.10.3.2021.191-199

[48] Hyun, S., Park, D., & Tian, S. (2021). Pricing of Green Labeling: A Comparison of Labeled and Unlabeled Green Bonds. *FINANCE RESEARCH LETTERS*, *41*. https://doi.org/10.1016/j.frl.2020.101816

[49] ICMA. (2018). Green Bonds Principles, Voluntary process Guidelines for issuing Green Bonds, (June).

[50] IFC. (2021). Emerging market green bonds report 2020 On the road to green recovery, 1–38. Retrieved from https://www.ifc.org/wps/wcm/connect/publications_ext_content/ifc_external_publication_site/publications_listing_page/emerging-market-green-bonds-report-2020

[51] International Capital Markets Association. (2020). Sustainability-Linked Bond Principles. *International Capital Markets Association*, (June), 1–11. Retrieved from https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/June-2020/Sustainability-Linked-Bond-PrinciplesJune-2020-100620.pdf

[52] Jin, J., Han, L., Wu, L., & Zeng, H. (2020). The hedging effect of green bonds on carbon market risk. *International Review of Financial Analysis*, *71*, 101509. https://doi.org/10.1016/j.irfa.2020.101509

[53] Kanamura, T. (2020). Are green bonds environmentally friendly and good performing assets? *Energy Economics*, *88*, 104767. https://doi.org/10.1016/j.eneco.2020.104767

[54] Kandir, S. Y., & Yakar, S. (2017). A New Financial Tool for Renewable Energy Investments: Green Bonds. *MALIYE DERGISI*, (172), 85–110.

[55] Kent Baker, H., Pandey, N., Kumar, S., & Haldar, A. (2020). A bibliometric analysis of board diversity: Current status, development, and future research directions. *Journal of Business Research*, *108*(November 2019), 232–246. https://doi.org/10.1016/j.jbusres.2019.11.025

[56] Khalid, A. M., & Rajaguru, G. (2018). Investigating the determinants of domestic bonds: the role of socio-economic and institutional factors. *Applied Economics*, *50*(1), 35–50. https://doi.org/10.1080/00036846.2017.1313951

[57] Khatri, P., Dutta, S., & Kaushik, N. (2021). Changing patterns of the teacher as a servant leader in Asia Pacific: a review and research agenda. *Asia Pacific Business Review*, *27*(2), 301–330. https://doi.org/10.1080/13602381.2020.1857562

[58] Kissinger, G., Gupta, A., Mulder, I., & Unterstell, N. (2019). Climate financing needs in the land sector under the Paris Agreement: An assessment of developing country perspectives. *Land Use Policy*, *83*(C), 256–269. Retrieved from https://econpapers.repec.org/RePEc:eee:lauspo:v:83:y:2019:i:c:p:256-269

[59] Kleinheksel, A. J., Rockich-Winston, N., Tawfik, H., & Wyatt, T. R. (2020). Qualitative Research in Pharmacy Education: Demystifying Content Analysis. *American Journal of Pharmaceutical Education*, *84*(1), 127–137. https://doi.org/10.5688/ajpe8417113

[60] Knoll, J., & Matthes, J. (2017). The effectiveness of celebrity endorsements: a meta-analysis. *Journal of the Academy of Marketing Science*, *45*(1), 55–75. https://doi.org/10.1007/s11747-016-0503-8

[61] Kondracki, N. L., Wellman, N. S., & Amundson, D. R. (2002). Content analysis: Review of methods and their applications in nutrition education. *Journal of Nutrition Education and Behavior*, *34*(4), 224–230. https://doi.org/10.1016/S1499-4046(06)60097-3

[62] Koseoglu, M. A. (2016). Growth and structure of authorship and co-authorship network in the strategic management realm: Evidence from the Strategic Management Journal. *BRQ Business Research Quarterly*, *19*(3), 153–170. https://doi.org/10.1016/j.brq.2016.02.001

[63] Kumar, S., Tomar, S., & Verma, D. (2019). Women's financial planning for retirement: Systematic literature review and future research agenda. *International Journal of Bank Marketing*, *37*(1), 120–141. https://doi.org/10.1108/IJBM-08-2017-0165

[64] Kuna-Marszalek, A., & Marszalek, J. (2017). Greening the Green - Environmental and Financial Aspects of the American Green Bond Market Development. In Culik, M (Ed.), *FINANCIAL MANAGEMENT OF FIRMS AND FINANCIAL INSTITUTIONS: 11TH INTERNATIONAL SCIENTIFIC CONFERENCE, PTS I-III* (pp. 468–475). FEECS, DEPT ELECTR POWER ENG, 17.

LISTOPADU 15, OSTRAVA, 70833, CZECH REPUBLIC: VSB-TECH UNIV OSTRAVA.

[65] Laband, D. N., & Tollison, R. D. (2000). Intellectual Collaboration. *Journal of Political Economy*, *108*(3), 632–662. https://doi.org/10.1086/262132

[66] Li, C., Wu, K., & Wu, J. (2017). A bibliometric analysis of research on haze during 2000–2016. *Environmental Science and Pollution Research*, *24*(32), 24733–24742. https://doi.org/10.1007/s11356-017-0440-1

[67] Lim, W. M., Yap, S. F., & Makkar, M. (2021). Home sharing in marketing and tourism at a tipping point: What do we know, how do we know, and where should we be heading? *Journal of Business Research*, *122*(August 2020), 534–566. https://doi.org/10.1016/j.jbusres.2020.08.051

[68] Liu, N., Liu, C., Da, B., Zhang, T., & Guan, F. (2021). Dependence and risk spillovers between green bonds and clean energy markets. *JOURNAL OF CLEANER PRODUCTION*, *279*. https://doi.org/10.1016/j.jclepro.2020.123595

[69] Löffler, K. U., Petreski, A., & Stephan, A. (2021). Drivers of green bond issuance and new evidence on the "greenium." *Eurasian Economic Review*, *11*(1), 1–24. https://doi.org/10.1007/s40822-020-00165-y

[70] Lu, K., & Wolfram, D. (2012). Measuring author research relatedness: A comparison of word-based, topic-based, and author cocitation approaches. *Journal of the American Society for Information Science and Technology*, *63*(10), 1973–1986. https://doi.org/10.1002/asi.22628

[71] Malorgio, A., Teti, E., & Dallocchio, M. (2021). Green Bonds: The Evolution of a Sustainable Financial Instrument on the Cutting Edge. *INTERNATIONAL REVIEW OF ENVIRONMENTAL AND RESOURCE ECONOMICS*, *15*(1–2), 95–135. https://doi.org/10.1561/101.00000134

[72] Maltais, A., & Nykvist, B. (2020). Understanding the role of green bonds in advancing sustainability. *Journal of Sustainable Finance and Investment*, *11*(3), 233–252. https://doi.org/10.1080/20430795.2020.1724864

[73] Mankata, L. M., Owusu-Manu, D.-G., Hosseini, M. R., & Edwards, D. J. (2020). Analysis of success-dependent factors for green bond financing of infrastructure projects in Ghana. *Journal of Sustainable Finance and Investment*. https://doi.org/10.1080/20430795.2020.1803640

[74] Mathews, J. A., & Kidney, S. (2012). Financing climate-friendly energy development through bonds. *Development Southern Africa*, *29*(2), 337–349. https://doi.org/10.1080/0376835X.2012.675702

[75] McInerney, C., & Bunn, D. W. (2019). Expansion of the investor base for the energy transition. *ENERGY POLICY*, *129*, 1240–1244. https://doi.org/10.1016/j.enpol.2019.03.035

[76] McInerney, C., & Johannsdottir, L. (2016). Lima Paris Action Agenda: Focus on Private Finance - note from COP21. *JOURNAL OF CLEANER PRODUCTION*, *126*, 707–710. https://doi.org/10.1016/j.jclepro.2016.02.116

[77] Mihalovits, Z., & Tapaszti, A. (2018). Green Bond, the Financial Instrument that Supports Sustainable Development Opportunities and Barriers. *PUBLIC FINANCE QUARTERLY-HUNGARY*, *63*(3), 303–318.

[78] Mohd Roslen, S. N., Yee, L. S., & Binti Ibrahim, S. A. (2017). Green Bond and shareholders' wealth: A multi-country event study. *International Journal of Globalisation and Small Business*, *9*(1), 61–69. https://doi.org/10.1504/IJGSB.2017.084701

[79] Monk, A., & Perkins, R. (2020). What explains the emergence and diffusion of green bonds? *Energy Policy*, *145*, 111641. https://doi.org/10.1016/j.enpol.2020.111641

[80] Moody, J. (2004). The structure of a social science collaboration network: Disciplinary cohesion from 1963 to 1999. *American Sociological Review*, *69*(2), 213–238. https://doi.org/10.1177/000312240406900204

[81] Naeem, M. A., Adekoya, O. B., & Oliyide, J. A. (2021). Asymmetric spillovers between green bonds and commodities. *JOURNAL OF CLEANER PRODUCTION*, *314*. https://doi.org/10.1016/j.jclepro.2021.128100

[82] Naeem, M. A., Farid, S., Ferrer, R., & Shahzad, S. J. H. (2021). Comparative efficiency of green and conventional bonds pre- and during COVID-19: An asymmetric multifractal detrended fluctuation analysis. *Energy Policy*, *153*, 112285. https://doi.org/10.1016/j.enpol.2021.112285

[83] Nanayakkara, K G M, & Colombage, S. (2020). Does compliance with Green Bond Principles bring

any benefit to make G20's 'Green economy plan' a reality? *Accounting and Finance*. https://doi.org/10.1111/acfi.12732

[84] Nanayakkara, Kariyawasam Galoluwage Madurika, & Colombage, S. (2021). Does compliance with Green Bond Principles bring any benefit to make G20's `Green economy plan' a reality? *ACCOUNTING AND FINANCE*, *61*(3), 4257–4285. https://doi.org/10.1111/acfi.12732

[85] Nation, U. (2015). The paris agreement. *Towards a Climate-Neutral Europe: Curbing the Trend*, 24–45. https://doi.org/10.4324/9789276082569-2

[86] Nofsinger, J., & Varma, A. (2014). Socially responsible funds and market crises. *JOURNAL OF BANKING & FINANCE*, *48*, 180–193. https://doi.org/10.1016/j.jbankfin.2013.12.016

[87] Noh, H. J. (2010). Financial strategy to accelerate innovation for green growth. *Korea Capital Market Institute*, 2–3.

[88] Noh, H. J. (2018). FINANCIAL STRATEGY TO ACCELERATE GREEN GROWTH by Asian Development Bank Institute. *ADBI Working Paper Series*, (866).

[89] Norris, M., & Oppenheim, C. (2007). Comparing alternatives to the Web of Science for coverage of the social sciences' literature. *Journal of Informetrics*, *1*(2), 161–169. https://doi.org/https://doi.org/10.1016/j.joi.2006.12.001

[90] Paranque, B., & Revelli, C. (2019). Ethico-economic analysis of impact finance: The case of Green Bonds. *Research in International Business and Finance*, *47*, 57–66. https://doi.org/10.1016/j.ribaf.2017.12.003

[91] Park, D., Park, J., & Ryu, D. (2020). Volatility Spillovers between Equity and Green Bond Markets. *Sustainability*, *12*(9), 3722. https://doi.org/10.3390/su12093722

[92] Park, S. K. (2018). INVESTORS AS REGULATORS: GREEN BONDS AND THE GOVERNANCE CHALLENGES OF THE SUSTAINABLE FINANCE REVOLUTION. *STANFORD JOURNAL OF INTERNATIONAL LAW*, *54*(1), 1–47.

[93] Paul, J., & Benito, G. R. G. (2018). A review of research on outward foreign direct investment from emerging countries, including China: what do we know, how do we know and where should we be heading? *Asia Pacific Business Review*, *24*(1), 90–115. https://doi.org/10.1080/13602381.2017.1357316

[94] Paul, J., Khatri, P., & Kaur Duggal, H. (2023). Frameworks for developing impactful systematic literature reviews and theory building: What, Why and How? *Journal of Decision Systems*, *00*(00), 1–14. https://doi.org/10.1080/12460125.2023.2197700

[95] Paul, J., Lim, W. M., O'Cass, A., Hao, A. W., & Bresciani, S. (2021). Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). *International Journal of Consumer Studies*, (April), 1–16. https://doi.org/10.1111/ijcs.12695

[96] Paul, J., & Mas, E. (2020). Toward a 7-P framework for international marketing. *Journal of Strategic Marketing*, *28*(8), 681–701. https://doi.org/10.1080/0965254X.2019.1569111

[97] Paul, J., & Rosado-Serrano, A. (2019). Gradual Internationalization vs Born-Global/International new venture models: A review and research agenda. *International Marketing Review*, *36*(6), 830–858. https://doi.org/10.1108/IMR-10-2018-0280

[98] Pham, L. (2016). Is it risky to go green? A volatility analysis of the green bond market. *Journal of Sustainable Finance and Investment*, *6*(4), 263–291. https://doi.org/10.1080/20430795.2016.1237244

[99] Pham, Linh, & Luu Duc Huynh, T. (2020). How does investor attention influence the green bond market? *Finance Research Letters*, *35*, 101533. https://doi.org/10.1016/j.frl.2020.101533

[100] Piñeiro-Chousa, J, López-Cabarcos, M. Á., Caby, J., & Šević, A. (2021). The influence of investor sentiment on the green bond market. *Technological Forecasting and Social Change*, *162*. https://doi.org/10.1016/j.techfore.2020.120351

[101] Piñeiro-Chousa, Juan, López-Cabarcos, M. Á., Caby, J., & Šević, A. (2021). The influence of investor sentiment on the green bond market. *Technological Forecasting and Social Change*, *162*, 120351. https://doi.org/10.1016/j.techfore.2020.120351

[102] Randhawa, K., Wilden, R., & Hohberger, J. (2016). A Bibliometric Review of Open Innovation: Setting a Research Agenda. *Journal of Product Innovation Management*, *33*(6), 750–772.

https://doi.org/10.1111/jpim.12312

[103] Reboredo, J. C. (2018). Green bond and financial markets: Co-movement, diversification and price spillover effects. *Energy Economics*, *74*, 38–50. https://doi.org/10.1016/j.eneco.2018.05.030

[104] Reed, P., Cort, T., & Yonavjak, L. (2019). Data-Driven Green Bond Ratings as a Market Catalyst. *The Journal of Investing*, *28*(2), 66–76. https://doi.org/10.3905/joi.2019.28.2.066

[105] Rosado-Serrano, A., Paul, J., & Dikova, D. (2018). International franchising: A literature review and research agenda. *Journal of Business Research*, *85*(January), 238–257. https://doi.org/10.1016/j.jbusres.2017.12.049

[106] Russo, A., Mariani, M., & Caragnano, A. (2021). Exploring the determinants of green bond issuance: Going beyond the long-lasting debate on performance consequences. *Business Strategy and the Environment*, *30*(1), 38–59. https://doi.org/10.1002/bse.2608

[107] Saheb, T., Jamthe, S., & Saheb, T. (2022). Developing a conceptual framework for identifying the ethical repercussions of artificial intelligence: A mixed method analysis. *Journal of AI, Robotics & …*, *1*, 371–398. Retrieved from https://www.ingentaconnect.com/content/hsp/airwa/2022/00000001/00000004/art00012%0Ahttps://www.researchgate.net/profile/Tahereh-Saheb-2/publication/363536045_Developing_a_conceptual_framework_for_identifying_the_ethical_repercussions_of_artificial_intellige

[108] Sahoo, S., Kumar, S., Sivarajah, U., Lim, W. M., Westland, J. C., & Kumar, A. (2022). *Blockchain for sustainable supply chain management: trends and ways forward*. *Electronic Commerce Research*. Springer US. https://doi.org/10.1007/s10660-022-09569-1

[109] Sanderson, O. (2018). *How to Trust Green Bonds: Blockchain, Climate, and the Institutional Bond Markets. Blockchain, Climate, and the Institutional Bond Markets.Transforming Climate Finance and Green Investment with Blockchains*. Elsevier. https://doi.org/10.1016/B978-0-12-814447-3.00020-3

[110] Sangiorgi, I., & Schopohl, L. (2021). Why do institutional investors buy green bonds: Evidence from a survey of European asset managers. *International Review of Financial Analysis*, *75*, 101738. https://doi.org/10.1016/j.irfa.2021.101738

[111] Savaya, R., Elsworth, G., & Rogers, P. (2009). Projected sustainability of innovative social programs. *Evaluation Review*, *33*(2), 189–205. https://doi.org/10.1177/0193841X08322860

[112] Siswantoro, D. (2018). Climate change concerns: the need for standardization of a second opinion on green bonds. In *INTERNATIONAL CONFERENCE ON CLIMATE CHANGE (ICCC 2018)* (Vol. 200). DIRAC HOUSE, TEMPLE BACK, BRISTOL BS1 6BE, ENGLAND: IOP PUBLISHING LTD. https://doi.org/10.1088/1755-1315/200/1/012049

[113] Small, H. (1973). Co citation in the scientific literature : A new measure of the relationship between two documents Related papers.

[114] Sutton, J., & Austin, Z. (2015). Qualitative reserch: data collection,analysis,and managment. *The Canadian Journal of Hospital Pharmacy*, *68*(3), 226–231.

[115] Talan, G., & Sharma, G. D. (2019). Doing well by doing good: A systematic review and research agenda for sustainable investment. *Sustainability (Switzerland)*, *11*(2). https://doi.org/10.3390/su11020353

[116] Tang, D Y, & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, *61*. https://doi.org/10.1016/j.jcorpfin.2018.12.001

[117] Tang, Dragon Yongjun, & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, *61*(SI), 101427. https://doi.org/10.1016/j.jcorpfin.2018.12.001

[118] Teplova, T. V., & Sokolova, T. V. (2018). Market Development Determinants for Corporate Bonds in National Currencies: Emerging Markets Review. *Journal of East-West Business*, *24*(1), 50–80. https://doi.org/10.1080/10669868.2017.1340387

[119] Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, *14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

[120] Tsay, M. Y. (2009). Citation analysis of Ted Nelson's works and his influence on hypertext concept.

*Scientometrics*, *79*(3), 451–472. https://doi.org/10.1007/s11192-008-1641-7

[121] van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

[122] Verma, A., & Agarwal, R. (2020). A Study of Green Bond Market in India: A Critical Review. In *IOP Conference Series: Materials Science and Engineering* (Vol. 804). Institute of Physics Publishing. https://doi.org/10.1088/1757-899X/804/1/012052

[123] Waltman, L., van Eck, N. J., & Noyons, E. C. M. (2010). A unified approach to mapping and clustering of bibliometric networks. *Journal of Informetrics*, *4*(4), 629–635. https://doi.org/10.1016/j.joi.2010.07.002

[124] Wang, C.-Y., Wang, D., Wang, F.-F., & Xu, G.-A. (2020). Multi-factor User Authentication Scheme for Multi-gateway Wireless Sensor Networks [面向多网关的无线传感器网络多因素认证协议]. *Jisuanji Xuebao/Chinese Journal of Computers*, *43*(4), 683–700. https://doi.org/10.11897/SP.J.1016.2020.00683

[125] Wiśniewski, M., & Zieliński, J. (2019). Green bonds as an innovative sovereign financial instrument. *Ekonomia i Prawo*, *18*(1), 83. https://doi.org/10.12775/EiP.2019.007

[126] World Bank. (2017a). Accelerate economic growth Build human capital Foster resilience End Extreme Poverty • Boost Shared Prosperity. *Annual Report 2017*, 87. Retrieved from http://www.worldbank.org/en/about/annual-report

[127] World Bank. (2017b). Report of the High-Level Commission on Carbon Prices. *Columbia University Libraries*.

[128] Zerbib, O. D. (2019). The effect of pro-environmental preferences on bond prices: Evidence from green bonds. *Journal of Banking & Finance*, *98*, 39–60. https://doi.org/10.1016/j.jbankfin.2018.10.012

[129] Zhang, H. (2020). Regulating green bond in China: definition divergence and implications for policy making. *Journal of Sustainable Finance and Investment*, *10*(2), 141–156. https://doi.org/10.1080/20430795.2019.1706310

[130] Zhang, R., Li, Y., & Liu, Y. (2021). Green bond issuance and corporate cost of capital. *Pacific-Basin Finance Journal*, *69*, 101626. https://doi.org/10.1016/j.pacfin.2021.101626

[131] Zhou, X., Zhang, R., & Polochova, V. (2021). The dependence of Chinese green and conventional bond markets under extreme and normal market conditions. *Environmental Science and Pollution Research*, *28*(38), 53208–53223. https://doi.org/10.1007/s11356-021-14050-x

[132] Zupic, I., & Čater, T. (2015). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, *18*(3), 429–472. https://doi.org/10.1177/1094428114562629