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Sustainability Linked Bonds an Instrument of Future Finance Based on Past Trends: A Bibliometric Analysis

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This paper aims raising awareness and provide information growing literature on Sustainability bonds (SB) or Sustainability-linked bonds (SLB). Society, individuals businesses that use natural resources also have duty to protect environment. In this context, bibliometric information was gathered by searching Scopus Core Collection database under heading "sustainable bonds or SLB.". Results were further filtered by eight keywords, followed by subject area. Sum of 142 documents is selected from Scopus database from 1987-2022 (July). This study deconstructs most influential articles and top contributing journals, authors, and countries. It also presents network visualizations on keyword cluster analysis, keywords based on authors, summary of 50 keywords, trending keywords based on abstract, , thematic evolution, and three-field plots in SB or SLB. Findings from study of years 1987 to 2022 demonstrate growth potential of SB or SLB. In India, there is gap in knowledge on SB or SLB. India has only worked on small number of keywords out of top 20 keywords hence it is advantageous for academics to contribute to this field of study. Study intends to provide emphasis on current research trends in area of SB or SLB along with trends in increasing investment through GSSSB's (Green, social, sustainable, sustainability linked bonds) and its implication in metaverse.

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Keywords: *SB, SLB, Systematic literature review, Bibliometric analysis, GSSSB's.*

0. INTRODUCTION

Future developments in finance are probably going to shape by a variety of factors, reflecting ongoing trends, technological advancements, regulatory changes, evolving market dynamics and sustainability aspects of the corporate seeking finances from the market which include socio-economic and environmental factors. Global outbreak of covid-19 infections impacts all aspects of human life, including social, economic, and physical aspects, everyone wants to assist in fight against corona virus infections. After outbreak of covid-19 humans and society have clearly understood need for societal development as well as protection of environment and it is need of hour to protect environment and responsibility for same lies upon corporate who utilizes resources of society without even giving back to society and environment. One should leave society better place than they have got. In 2007 U.N Intergovernmental panel for climate change published report linking human activity to global warming.

To leave earth better place world bank and centre for international climate and environment research collaborated to establish process debt market to be part of solution and this leads to origin of green bonds which were first issued by European Investment bank and world bank in year 2007-2008 Issuance of green bonds forms basis for sustainable bonds market by creating criteria for issuance and reporting. ICMA on basis of green bonds issued voluntary guidelines for SB and SLB (NOTE 1). SB are debt market wherein companies issuing SB use finance on both green and social projects and primarily determined by issuing companies.

Green bonds, social bonds, sustainability bonds and sustainability linked bonds are new type of bond in sustainable finance. It's brand-new market entrance. SLB are superior option to green bonds for reason that it is not conditional on usage of particular purpose. (ICMA Corporation, 2020) SLB ("slbs") are type of bond instrument for which financial and/or structural characteristics can vary depending on whether issuer achieves predefined Sustainability/ ESG objectives. JBS USA announced successful offering of SLB wherein' goal is to attain net-zero greenhouse gas emissions by 2040 and 30% reduction in greenhouse gas emissions in its operations by 2030. Investors will be more interested in SLB if JBS fails to meet its aims as Investors will get more interest on issued bonds.

(Framework & Paoli, n.d.) ENEL multinational energy and utility company is first company that issues SLB. ENEL able to raise 1.5 billion U.S dollars bond from U.S. market. ENEL has mostly concentrated on SDG 7, SDG 9,

SDG 11, and SDG 13 contributions. Green bonds make it easier to raise funds for projects that help environment. Social bonds promote projects that may have positive impact on society's members. More issuers can access SLB than green bonds for variety of reasons, including fact that these bonds have fewer financial restrictions. Investors gain in-depth understanding of company before investing, which is beneficial to investors, issuers, and market, proceeds of SLB are used by issuers who do not rely on green expenditure to fund green project. According to global sustainability investment alliance's (GSIA) global sustainability review, sustainability investment business was worth $35.5 trillion by 2020. ENEL, Suzano, Novartis, and Chanel are among few companies that have issued SLB.

The trend of bonds associated with sustainability points to a promising future for this type of financing. In order to evaluate advancements in research field of SB or SLB and to give conclusive evaluation, study's objective is to examine prior research on SB or SLB using quantitative bibliometric analysis and investment analysis. Current analysis, which is unique, demonstrates how SB or SLB are becoming more significant across all industries. Study also tries to investigate relevant keyword usage and is divided into several sections, including literature review, methodological section, results, conclusion, and areas for future research.

Note-1 = Sustainability bond = SB, Sustainability-linked Bond= SLB

1. LITERATURE REVIEW

(Maltais & Nykvist, 2021)Financial innovation also focuses on sustainability, such as green bonds, green investments, and sustainable bonds, in order to better understand impact of green labels on bonds and market participation when issuing green bonds.

(Khalifah, 2019)Green bonds issued in stock market have favourable influence, according to study. Green bond, which is issued by number of countries, has favourable impact on stock market and raises ROA and ROE. Environmental performance has resulted in decrease in CO2 emissions and rise in environmental ratings.

(P.N.Harikumar & D, 2017)According to study, there is discussion regarding global green bond scenario. This paper issues posed by green bonds are examined, as well as some recommendations for smooth operation of green bonds. This research is also beneficial to company's issuer, investor, and financial performance.

(Gerner, 2019)Corporate sustainability is relatively new concept in marketplace. In terms of innovation, business model development, and socio-culture, fundamental market conditions have shifted. New life cycle for products and services that is concerned with their long-term viability.

(Fernández et al., 2013)This paper is dedicated to concerns and obstacles of corporate debt market development in India, according to study, due to lack of awareness of corporate debt. Handful of countries performs better than India in terms of market development of corporate debt. Some policy recommendations are also made for development of corporate debt.

(Giráldez & Fontana, 2021)Economic development, environmental protection, and social development are three main objectives of sustainable development. GSS bonds have progressed in recent years, with introduction of SLB.

(Liberadzki et al., 2021)SLBs have been issued by Tesco. It has pledged to reduce greenhouse gas emissions by 60%. Reduce use of non-renewable grid electricity while focusing on renewables. If goals aren't met, last three coupons will see 25 basis point coupon step-up.

(Directorate, 2021)Interviews with specialists from public development banks, credit rating agencies, asset managers, and industry associations are used to compile reported survey. New creative financial instrument benefits developing countries while simultaneously enhancing capacity building and making policy recommendations.

(Cortellini & Panetta, 2021)According to study, existing literature reviews on green bonds were used to illustrate future research scenario. International Capital Markets Association, Climate Bond Initiative, European Commission, People's Bank of China and ASEAN Capital Market Forum are leading charge for green bonds globally. Clear picture of how green bonds and markets function, as well as stock market's reaction.

(International Capital Markets Association, 2020) provides SLB rules as well as structuring, disclosure, and reporting advice. SLB are relatively new market trend. Importance of information transparency, correctness, and integrity is also emphasized by SLBs. Selection of Key Performance Indicators, Calibration of Sustainability Performance Targets, Bond features, Reporting, and Verification are five essential components.

(Bilbao-Terol et al., 2014) evaluating sustainability of investments in sovereign bonds using TOPSIS method. TOPSIS is multi-criteria decision-making technique that uses minimization of distance from an ideal point and maximisation of distance from an anti-ideal point to rank finite set of choices. Numerous indices, including socioeconomic, environmental, and human development indices, have been used to assess sustainability in development.

(Berrada & Engelhardt, 2022)This study develops framework for comprehending structure and price of SLB. firm is motivated by bond that is tied to sustainability if company fails to meet environmental targets that have been set in advance investors will receive more interest from company. Bloomberg, Refinitve, and company websites gather all data. Researcher

develops relationship between mispricing measure and firm's cost of financing.

(Kölbel & Lambillon, 2022)This study develops framework to examine phenomenon of SLB. Issuer is aware of pre-established environmental improvement aim. Issuer has ability to enhance sustainability. If corporation is unable to meet established goal, issuer will get sustainability premium. SLBs might potentially constitute greenwashing. By issuing SLBs, benefits including improved sustainability and financial optimization can both be realised.

2. OBJECTIVES

- To understand annual scientific publication growth, country-wise documents and citations per documents published by using bibliometric analysis.
- To determine cluster topics based on abstract and summary of keywords used in area of SB or SLB.
- To understand network visualization of co-occurrence of keywords and average cited papers in area of SB or SLB.
- To study the total size of Indian GSS market, annually investment growth and market composition of different issuer in field of green, social, sustainability, sustainability-linked bonds.

3. METHODOLOGY

Bibliometric analysis tool provides quantitative data insights into SB or SLB. Scopus database literature search was carried out. as we believe bibliometrics to be trustworthy source. Various document kinds, such as articles, books, chapters, and research papers, are included in study.

ASSEMBLING
SEARCH DOCUMENTS: SUSTAINABILITY BONDS OR SUSTAINABILITY-LINKED BONDS
SEARCH DATABASE: SCOPUS
SEARCH RESULT: 1664

In study, systematic searching and data filtering were used to find and remove irrelevant articles. This was done by 1) assembling first, using specific search documents (SB or SLB) to find 1664 papers, and 2) second step is arranging to refine search parameters. Read summaries of all 1664 research articles, then filter results based on specific keywords and subject areas to remove any papers that aren't relevant. And 3) third step is assessing to data

analysis follows. Keywords chosen for literature search were SB or SLB. When mining Scopus data, following query statement is used: (TITLE-ABS-KEY) ("sustainability" and "bonds" or "sustainability-linked" and "bonds"). Total of 1664 documents were acquired and read all abstracts of research papers. Based on abstract, findings were refined by keywords.

ARRANGING

Refine Result:1. KEYWORDS

2 SUBJECT AREAS

Keywords: Sustainable, Sustainable Development, Environmental Sustainability, Environment impact, Green bonds, Climate change, Economic Growth, and Environmental Protection. (733 Documents)

Subject Area:1. BUSINESS, MANAGEMENT, AND ACCOUNTING

2. ECONOMIC & ECONOMETRICS AND ACCOUNTING

3. MULTIDISCIPLINARY

(142 DOCUMENTS)

ASSESSING

Analysis Method: Bibliometric analysis techniques, namely:

Important Information about data, annual scientific production, most productive journal, country documents and citations per documents, top cited papers, and author production.

Network visualization on keywords cluster analysis, keyword based on authors, a summary of 50 keywords, trending keywords based on abstract, co-citations analysis on references, thematic evolution, and three-field plot.

Reporting Convention: Figures, tables, and words

Limitation: A bibliometric analysis based on Scopus.

Support: No funding received

Researcher chose eight keywords, including climate change, sustainable, sustainability development, green bonds, economic growth, environmental impact, environmental protection, and environmental sustainability. 733 papers in all were acquired. Based on subject areas like business, management, and accounting, economics & econometrics, and accounting, and multidisciplinary, document were excluded. In end, 142 articles were used in analysis.(Kumar et al., 2022)

Comma separated value was used to extract data from Scopus for data analysis. This study examines SB or SLB that are utilising variety of methods, including VOS viewer and R-studio. In addition to other metrics like three-field plot and thematic analysis, it also uses bibliometric indicators to depict

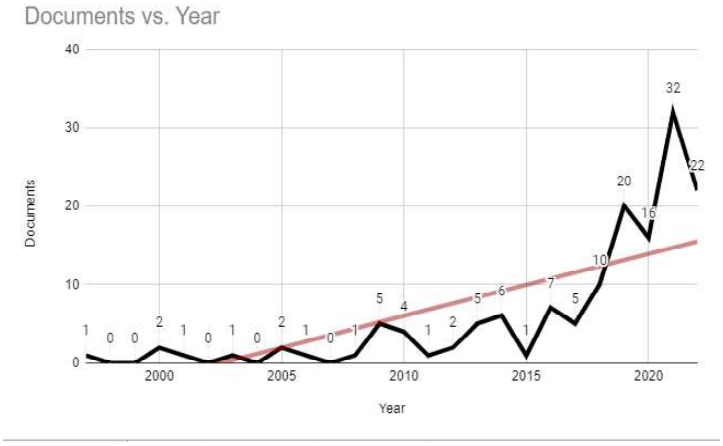
bibliographic data, such as overall number of publications and citations to assess production and impact, respectively. 'Biblioshiny' package in RStudio is additionally utilised to enhance content analysis of publication.

4. RESULTS

The results include two analyses. Bibliometric analysis is one of them, while investment analysis is the other.

A) BASED ON BIBLIOMETRIC ANALYSIS

Figure-1: Graphical Representation of Annual Scientific Production (document vs. year)



New and global investments are subject of my study on SB and SLB. In 1997, one document was published, and in 2000, two documents were published (Paule-Vianez et al., 2020). It is clear image of document's publishing in SB and SLB are expanding, and expertise in this area is also increasing. As each year passes, number of documents published grows figure1. In 2021, 32 documents were published, compared to only 2 documents published in 2005. As result, there is lot more room for growth in this field. Annual growth rate is 12.5%.

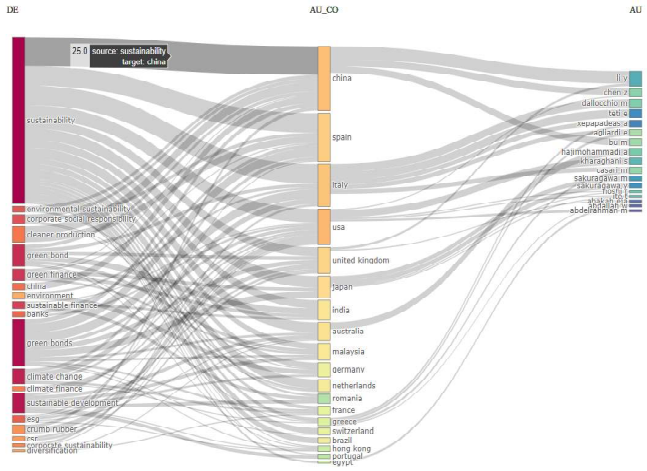


Figure- 2: Depicts a detailed prestation of authors, keywords and countries :- three field plot

Note: DE- Keyword, AU-CO – Country, AU- Author

Figure 2 describes three parameteres i.e. Authors' names, country of origin, and keywords. Authors forms right field, nation forms centre, and keywords forms left field. It identifies article's main theme and creates thematic connection between author's name, country of origin, and keywords. "Sustainability" has gained popularity in each country, but authors in Spain, India, Malaysia, Germany, Netherlands and other nations have not written anything about sustainability. Author and other publications have worked on green bonds in Italy. For instance**,** keyword is sustainability target used in India but no collaboration has been established between India and top 20 authors.

Figure-3: Depicts a detailed presentation themantic evoluation by using three time period.

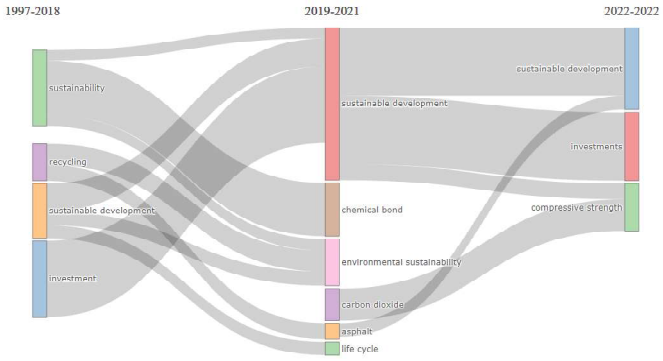
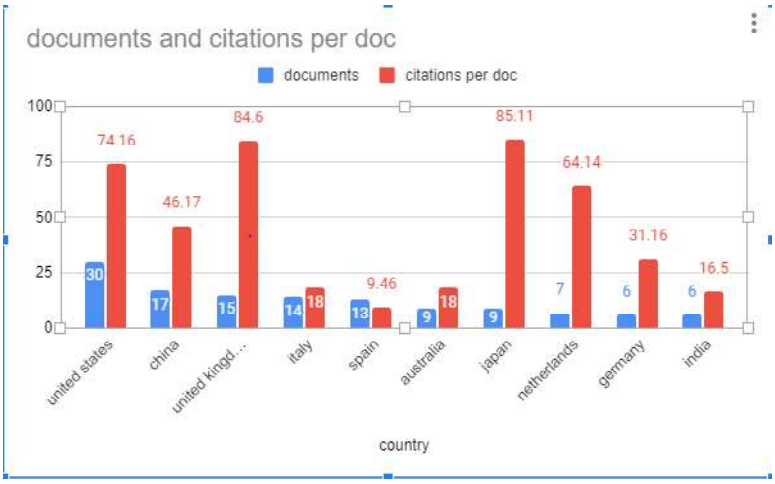


Figure 3 describes development and connections between study subjects, categorised into 3 analytical periods. Traits of lines determine quality of connections between keywords. Structure of research topics into fundamental and driving themes is made possible by map of thematic growth of scientific production. Thematic evolution that has affected data chosen from 1997 to present is depicted in this figure 3. Research areas closely related to one another. Years 2019–2021 saw biggest contribution of articles. Sustainability has combined with chemical bonds, sustainability development, and environmental impact, becoming this way single topic (Melega Stefan & Melega, 2022). It's possible that the financial sector will keep coming up with novel financial solutions and sustainable financial frameworks. This could entail creating new kinds of bonds, green financial derivatives, or other financial products that link sustainability measures to financial success like investment has combined with sustainable.

Figure-4: Graphical representation of country documents and citations per document



In Figure 4, data shows summary of top 10 countries as well as number of publications with citations per documents. (Ghosh & Satya Prasad, 2021). Majority of articles from United States (30) and citations per doc (74.16). China submitted 17 articles and citations per doc (46.17). They all contained publications geared for particular country. From 1997 to 2018, no work published in India. In year 2019 first-time documents have been published. India has contributed only 6 documents and citations per doc (16.5) are high. There is significant potential in India. The impact factor is 2.75 which are indicating that there is still need for future research on sustainability bond or sustainability-linked bond. A high citation per document indicates that many

researchers are working on it that awareness is generally raising in India. Developed world like UK, Netherlands and Germany are more sensitive with respect of sustainability bonds or sustainability-linked bonds.

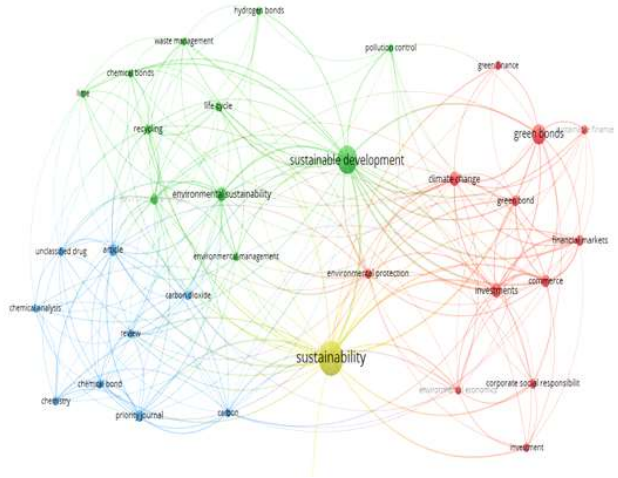
Serial Number	States	Document	Citations per document	Impact Factor
1	United States	30	74.16	2.472
2	China	17	46.17	2.715
3	United Kingdom	15	84.6	5.64
4	Italy	14	18	1.28
5	Spain	13	9.46	0.727
6	Australia	9	18	2
7	Japan	9	85.11	9.45
8	Netherlands	7	64.14	9.16
9	Germany	6	31.16	5.19
10	India	6	16.5	2.75

Table-1: Showing Chart of Top 10 Cited Paper

TITLE	COUNTRY	RESEARCH PAPER	DATA COLLECTION/ TECHNIQUE	KEYWORDS	OBJECTIVE
Social Capital and Collective Management of Resource	United Kingdom	Qualitative	NA	NA	To understand sustainable management and governance of common resources and captures idea of social bonds
High-Valent Organometallic Copper and Palladium in Catalysis	United States	Qualitative	NA	NA	Improvement in chemicals drastically reduces environmental impact and increases sustainability, expanding scope of high-valent palladium.
Mechanically robust, readily repairable polymers via tailored noncovalent cross-linking	Japan	Qualitative	NA	NA	For sustainable societies, significant task is increase variety of materials that can be repaired.
Scalable and Sustainable Electrochemical allylic C-H Oxidation.	United States	Quantitative	NA	NA	Adoption of this C-H oxidation strategy in large-scale industries without sustainable environmental impact also describes Electrochemical C-H Oxidation Strategy
Developing Fibrillated Cellulose as Sustainable Technological Material	United States	Quantitative	NA	NA	
Sustainable Fe-ppm Pd nanoparticle catalysis of Suzuki-Miyaura cross-couplings in water	Switzerland	Quantitative	NA	NA	Examine fibrillated cellulose is used to create variety of materials, including composites, macrofibres, thin films, porous membranes, and gels. Understanding factors for scaling up production of this class of minerals.
Rapid and near-complete dissolution of wood lignin at<**80** by recyclable acid hydrotrope	China	Quantitative	NA	NA	At 80°C or lower, we were able to solubilize 90% of NE222 (hardwood) lignin in about 20 minutes. Additionally, we were able to dissolve 65 to 85% of xylan and obtain little glucan loss of 15% or less, particularly at temperatures of 65°C or below.
Consumer-product Attachment: Measurement and design implication	Netherlands	Quantitative	Questionnaire-Confirmatory factor analysis	Attachment, Enjoyment; Memories, Product Experience; Sustainability	Interrelationship between product attachment, irreplaceability, self-extension and indispensability.

Table 1 present focus of top 10 cited papers on SB or SLB (Kumar et al., 2022). By reading top 10 referenced research papers, study finds out what major points are. By reading complete research paper, study gets useful information in terms of title, referenced year, journal, nation, research paper, and data gathering method, keywords, and aims. 948 authors referenced social capital and collaborative resource management in year 2003 with support of science publication. Goal of this article is to comprehend sustainable management and governance of common resources and also grasp theme of social bonds and describe qualitative technique. Second highly referenced research work was published in United States with help of Nature publication in 2012 and received 620 citations.

Figure-5: Represents Network of Keyword Cluster Analysis Items- 34, Cluster-4, Links-245, Total Link Strength- 598



Cluster-1: Green Bonds- Red colour

SERIAL NUMBER	ITEMS	LINKS	TOTAL LINK STRENGTH	TOTAL OCCURRENCE
1	Climate Change	19	43	14
2	Commerce	14	51	11
3	Corporate Social Responsibility	10	18	7
4	Environment Economics	14	24	5
5	Environment Protection	19	33	7
6	Financial Markets	13	41	8
7	Green Bond	14	31	8
8	Green Bonds	13	42	27
9	Green Finance	5	11	6
10	Investments	16	61	13
11	Investment	8	17	6
12	Sustainable Finance	8	13	6

Cluster 2: Sustainable Development : Dark green colour

SERIAL NUMBER	ITEMS	LINKS	TOTAL LINK STRENGTH	TOTAL OCCURRENCE
1	Climate Change	19	43	14
2	Commerce	14	51	11
3	Corporate Social Responsibility	10	18	7
4	Environment Economics	14	24	5
5	Environment Protection	19	33	7
6	Financial Markets	13	41	8
7	Green Bond	14	31	8
8	Green Bonds	13	42	27
9	Green Finance	5	11	6
10	Investments	16	61	13
11	Investment	8	17	6
12	Sustainable Finance	8	13	6

Cluster-3: Article- Blue colour

SERIAL NUMBER	ITEMS	LINKS	TOTAL LINK STRENGTH	TOTAL OCCURRENCE
1	Article	19	52	11
2	Carbon	18	34	6
3	Carbon dioxide	16	24	6
4	Chemical Analysis	12	17	5
5	Chemical Bond	14	32	6
6	Chemistry	12	26	6
7	Priority Journal	14	44	9
8	Review	15	28	6
9	Unclassified Drug	15	28	5

Cluster-4: Sustainability: Yellow colour

SERIAL NUMBER	ITEMS	LINKS	TOTAL LINK STRENGTH	TOTAL OCCURRENCE
1	Sustainability	32	141	80
2	Debt	1	4	5

Four significant themes shown by network analysis of keyword co-occurrence findings for SB or SLB, which is presented in Fig. 5 in whole (Kumar et al., 2022). There are four clusters: first is composed of green bonds (red), second of sustainability development (dark green), third of articles (blue), and fourth of sustainability (yellow). Largest cluster contains 12 items, including "Sustainable Finance," "Green Bonds," "Green Finance," "Green Bonds," "Commerce," "Corporate Social Responsibility," "Environment Economics," "Environment Protection," "Financial Markets," and "Climate Change.". Second largest cluster contains 11 items, including "Chemical Bonds", "Environment Impact", "Environment Management", "Environment Sustainable", "Hydrogen Bond", "Life Cycle", "Lime", "Pollution Control", "Recycling", "Sustainable Development", and "Waste Management". Red cluster pertains to green bonds, comprising 35.29% of total keywords. Dark green cluster pertains to sustainability development, comprising 32.35% of total keywords and 26.47% of total keywords in blue cluster. Fourth yellow cluster has 5.88% of total keywords.

Figure-6: Represents a summary of 50 keywords- keyword plus

Figure 6 provides summary of 50 keywords. Sustainability development has contributed highest number of documents (43) and 11percent of total documents (Alshater et al., 2021). Second most contributed keyword has sustainability with 27 documents and 7 percent of all documents (Çelik, 2021).

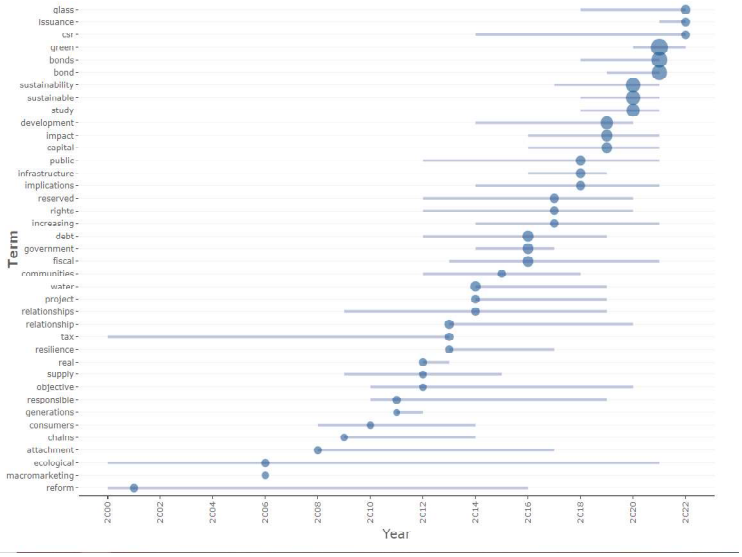
Only 3 percent of materials include contributions on investments, articles, environmental effect, environmental sustainability, and climate change. Remaining documents are all provided at 2 percent and 1 percent.

Figure-7: Represents Word Cloud- Keywords based on Authors

Figure 7 gives precise information on keywords that was acquired and reviewed by author using r-studio program. Word cloud of frequently used terms based on authors of SB or SLB (Agbo et al., 2021) most documents have been contributed by sustainability (56). There are 27 documents published in second-highest document on green bonds. Ten documents are published in third-highest document on sustainable development.

Figure-8: Represents Keywords based on Abstract

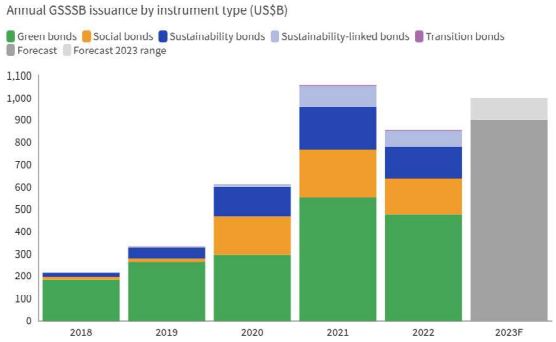
Figure 8 displays specific details regarding keywords based on abstracts that was gathered and examined using r-studio tool. It showing most effective keywords based on abstracts. Most popular keywords in 2022 are "glass", "insurance" and "CSR". In 2021, keywords that are most popular include bond, green, and bonds. In 2020, study, sustainability and sustainable are most popular buzzwords. For year 2019, development, impact and capital are top search terms. In year 2000, just three keywords-ecological, tax, and reform began to contribute (Alshater et al., 2021). Relationship between all sorts of keywords, such as keywords clustering based on all keywords (figure 5), summary of 50 keywords (figure 6), keywords based on authors (figure 7) and keywords based on abstract (figure 8) by utilising tools VOS viewer and r-studio-bibloshiny. Green bonds make up largest cluster (figure 5), which can contain up to 12 items and describes 35.29 percent of all keywords. With 11 items, sustainable development makes up second-largest cluster (figure 5) and describes 32.35 percent of all terms. Sustainability development supplied most documents (43) and 11% of total articles in summary of 50 keywords (figure 6).



Sustainability is second most (figure 6) often used keyword, appearing in 27 documents, or 7% of all documents. Word cloud in Figure 7 shows that highest document on sustainability and green bonds with second-highest contribution were both based on authors' keywords. Bond, green, and bonds are among most common trending terms based on abstracts' keywords in figure 8. Based on abstracts' keywords (Figure 8) in 2020, top keywords are study, sustainability, and sustainable. Study looked at how several types of keywords related to one another, including co-occurrence networks, keywords based on authors and abstracts, and list of 50 keywords. Study displays connections between each keyword like green bonds and sustainability development (based on keyword co-occurrence networks), sustainability and green bonds (based on authors), sustainability development and sustainability (summary of 50 keywords), and green, sustainability, and bonds (based on abstract) because researcher examined all 1664 research paper abstracts before using particular keywords to filter findings. I conducted this investigation for my study.

B) BASED ON INVESTMENT ANALYSIS

Figure-1: Annual GSSSB Investment



Investments in sustainability bonds, social bonds, green bonds, sustainability-linked bonds, and other bonds are displayed in this figure1. This data was obtained from S&P Global Ratings' Environmental Finance Bond Database. The Worldwide GSSSB issuance is expected to increase (*Global Sustainable Bonds 2023 Issuance to exceed $900 Billion _ S&P Global*, n.d.)by $900 billion to $1 trillion, According to prediction. Sustainability bonds and sustainability linked bonds are becoming more and more popular investments every year. Greater market share for this asset class in all areas and industries will result from the GSSSB issuance's faster expansion.

Figure-2: Indian GSS Market

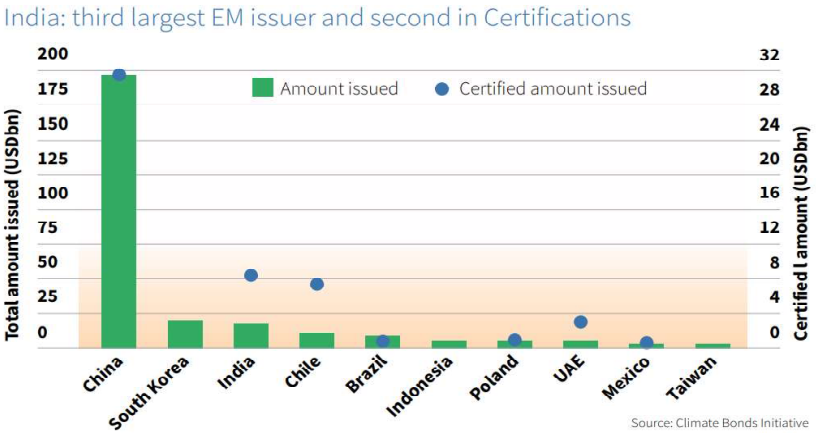
Total size of the Indian GSS market as of 31/12/2021

	Green	Sustainability*	Social*	Total
Total size of market	USD18.3bn	USD600m	USD500m	**USD19.5bn**
Number of issuers	72	1	2	**75**
Number of currencies	3	1	2	**3**

This figure 2 (Bhattacharya et al., 2022)depicts that as on 31/12/2021. It represent the green, social and sustainability bonds. The Total Size Of The Indian Gss(green, social, sustainability) Market is 19.5 Bn Dollars Wherein The Major Proportion Of Gss Market Is Hold By Green Bonds Wherein There Are 72 Issuers In Three Different Currencies Having Share Of 18.3 Boiilion

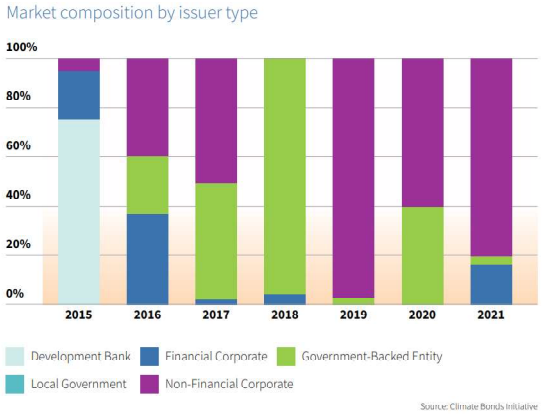
Us Dollars And Sustainability Bonds Have 1 Issuer Having 600 M And Social Market Having 2 Issuer Bearing 500 M Us Dollars.

Figure-3: Amount Issued and Certification Amount Issued



The figure 3 depicts the amount issued and certified amount issued through green bonds wherein china has issued a total of 175 billion us dollars whein the cerified amount issued is 200 billion dolus dollars, also india has certified amount issued for grren bonds is 50 billion us dollars and has issued only 24 billion us dollars green bonds. this picture also depicts the data in respect of other countries also.

Figure-4: Market Composition of Different Issuer



In figure 4 (Bhattacharya et al., 2022)depicts the trend and maket composition of different issuer from 2015 to 2021 whereas in 2015 the 75%

of market hold by development bank followed by fincial and non financial coporate wherein in 2021 the majority i.e 80% share hold by non financial corporate followed by financial corporate and govt backed entity.

5. IMPLICATIONS OF METAVERSE ON GROWTH OF GSSSB'S

Financial instruments known as sustainability-linked bonds (SLBs) are made to encourage and assist issuers in meeting predetermined sustainability goals. The financial terms of these bonds are linked to the issuer's performance on sustainability indicators, including coupon payments. Several possible linkages might be investigated when thinking about the metaverse and its implications for future finance, particularly sustainability-linked bonds like green and sustainable virtual real estate, carbon-netural virtual platforms, renewable energy for virtual infrastructure and others also. In these digital areas, the accomplishment of certain environmental objectives may result in advantageous terms for bondholders. Significant infrastructure and processing power are needed for the metaverse. Businesses that create and manage virtual platforms may offer bonds that are based on sustainability measures, promoting the use of renewable energy sources for virtual infrastructure and data centres. It's critical to acknowledge how quickly the metaverse and sustainable finance are developing. Regulations, industry norms, and public expectations will probably influence how sustainability-related alliances evolve in the metaverse.

6. THEORETICALLY CONTRIBUTION

This study theoretically discusses about bonds that have contributed, who are annual scientific production, total size of Indian GSS market, market composition of different issuer and other relevant topics. Discovery of keywords clustering, summary of 50 keywords, and keywords based on abstract is another distinctive feature of this study. Another distinctive feature of this study is correlation between author's name, country of origin, and keywords as well as correlation between subject's keywords and analytical time periods. There haven't been many studies on this topic that have used bibliometric analysis. This research improves our understanding of planet and contributes to environmental and social progress.

7. RESEARCH IMPLICATION

The survey demonstrates that awareness of new global approach of investment. There have been very few contributions in this field. Company issue SLB to raise fund. In these bonds, there is no compulsory principle to use fund on environment. Fund can be used by company to achieve financial growth as well as work on decarbonization. If predetermined objective of net-

zero carbon emissions is not met, it is also huge gain for investors. Investors will receive higher interest rate. There is low level of awareness regarding this investment in India. For this point of view, research has wide scope in this field. This study will helpful for stakeholders ranging from investors, government, society, employee and others also. This study will also touch upon the issue of increasing reach of GSSSB'S through metaverse and also outline the concern of cyber security in metaverse.

8. CONCLUSION

Study aims to provide systematic literature review and bibliometric analysis in area of sustainable bonds and SLB from 1997 till to 2022 (July). Investors want to see both financial and non-financial reports when they invest. Investors want to know how concerned company is about environment, reducing greenhouse gas emissions, and addressing climate change, among other things. Investors are interested in examining both financial and non-financial reporting. Investing nowadays is also linked to advancement of sustainable development. Green bonds have gotten lot of attention, but SB and SLB have gotten lot less attention. There is an interesting element here: number of years is increasing, and number of publications is increasing as well. The United States and China have contributed more but very little contribution of India. There is great potential in domain of bonds. Environmental, social, and governance (ESG) factors have not yet reached their full potential. It's something we need to improve on. Governments and agencies are increasingly issuing branded bonds to raise funds for wider range of sustainable development projects. These issuers are at vanguard of addressing social and environmental concerns posed by climate change, as well as other critical challenges of twenty-first century, such as maintaining social cohesion in face of rising income disparity. Study also provides bibliometric analysis by reading abstracts of every research paper published in journals with Scopus index between 1997 and 2022. Research was mostly concerned with keywords and their contributions to India. By establishing connections between network visualisation of keyword clustering, keywords based on authors, trending keywords based on abstract, and summary of 50 keywords, study provides thorough understanding. The study also displays the total size of Indian GSS market, annually investment growth and market composition of different issuer in field of green, social, sustainability, sustainability-linked bonds**.** It establishes thematic link between author's name, place of origin, and keywords as well as strength of link between keywords and analytical time period. It is also imperative to mention that the increasing trends of GSSSB'S clearly points out that the GSSSB'S are future of finance and increasing use of technology and metaverse makes sure that the GSSSB's will reach to the masses for which robust cybersecurity principles needs to be incorporated.

9. LIMITATIONS

There are some limitations to this study. For data collection, only Scopus-indexed papers were considered. This work does not make use of Web of Science. Research is restricted to previously published works on bonds linked to sustainability up until 2021. Another restriction is that only Vos viewer and R STUDIO are used to examine data for bibliometric purposes.

10. FUTURE SCOPE

New kinds of global investment are green, social, sustainability and sustainability-linked bonds. Research can expand in this area. There is less work done in India. In India, there is significant potential for green, social, sustainability and sustainability linked bonds. Future research initiatives can potentially utilize web of science. Study simply makes use of two software programs. Numerous tools are available for bibliometric analysis. This study also outlines the implications of metaverse on landscape of the financial system in future.

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