

# A Systematic Literature Review of Green Finance

Thuy Thi Thanh VU<sup>1</sup>; Oanh Thi Tu LE<sup>2</sup>; Nhung Thi Hong PHAM<sup>3\*</sup>

<sup>1,2</sup>University of Labour and Social Affairs, Hanoi, Vietnam

<sup>1,2</sup>University of Labour and Social Affairs, Hanoi, Vietnam

<sup>3\*</sup> Joint Stock Commercial Bank For Foreign Trade of Vietnam, Hanoi, Vietnam

Date of Submission: 15-09-2023

Date of Acceptance: 25-09-2023

## ABSTRACT

The study comprehensively analyzes previous academic studies on "Green Finance". Based on the OpenAlex database of Vosviewer 1.16.19 software, articles with the keyword "green finance" were filtered in the Abstract, obtaining 2,157 articles as of September 16, 2023. Perform statistical analysis Descriptive statistics, the study has provided the number of articles published over time, accordingly, research on Green Finance has been conducted since 1931 by Hotelling, H., but the number increases sharply from 2021 by 2023, peaking in 2023 with 702 articles. China is the most influential country in research on Green Finance, as shown by the number of articles, the number of citations (867 articles & 12,112 times), the number of authors, and the number of leading universities in the number of articles. writing and citations. The study also provides additional information such as the most frequently appearing Concepts and Most Cited Documents on Green Finance. With systematic statistical results from academic data on Green Finance, the study has added to the literature review, serving as a basis for future reference studies.

**Keywords:** Green Finance, Overview Research, VOSviewer.

## I. INTRODUCTION

According to statistics from the United Nations Environment Program (UNEP), in 2013: in the 25 years from 2013 onwards, the world economy grew four times and brought benefits to hundreds of millions of people. However, up to 60% of the goods and services produced negatively affect the Earth's ecosystem. Researching and finding comprehensive solutions to limit the negative impacts of climate change is urgent in the world. Green finance is one of the tools to solve this problem.

Green finance plays an important role in green development strategies in every country in the world, (Tran T. T. T. & Nguyen T. H. L., 2016). The strategy promotes restructuring and perfecting institutions towards greening economic sectors, using natural resources more effectively, responding to climate change, and ensuring sustainable economic development.

Green finance is one of three pillars that has received special attention from national governments and researchers in recent years. However, the concept of Green Finance was first researched in 1931 by Hotelling, H.

There are many ways to understand green finance: Green finance is a loan or investment that promotes environmentally positive activities, such as purchasing environmentally friendly goods and services or building facilities. green infrastructure (Siddhesh Shinde, 2023). As the dangers associated with ecologically destructive products and services increase, green finance is becoming a mainstream phenomenon. Green finance benefits people, the economy, and the environment. It expands access to environmentally friendly goods and services for individuals and businesses, balancing the transition to a low-carbon society, and leading to more socially inclusive growth. This leads to a 'great green multiplier' effect in which both the economy and the environment benefit, making everyone better off.

From another perspective, green finance is a broad concept that includes financial investments to support sustainable development initiatives and projects, environmental products, and policies to encourage economic development. sustainable economy (Höhne et al., 2012). Green finance not only includes climate finance but can also be understood as a series of measures to achieve other environmental goals such as controlling industrial pollution levels, and wastewater sources or

protecting the diversity of the ecosystem. Green finance is directly related to financing activities that address climate change, such as investments in projects and programs that aim to reduce or eliminate greenhouse gases (GHGs) or other investments. Investing in reducing the impact of climate change on goods and people.

According to Lindenberg, N. (2014), for the banking sector, green finance is defined as the process of making lending decisions, and monitoring and managing risks after lending to groups of products and services. financial services to encourage investments that protect the environment, supporting the implementation of industries, projects, or technologies that cause less negative harm to the environment. For example, investing in industries with low carbon emissions and encouraging the use of renewable energy technology.

According to Böhnke et al. (2014), green finance includes all forms of investment and lending that focus on environmental impact and support environmental sustainability. An important element of green finance is building a "green" banking system in which lending and investment decisions are factored into differential capital. It is always necessary to remember and evaluate the risks that impact the green environment: meeting environmental protection standards.

Thus, Green Finance can be understood as a complete set of forms of financing for environmentally friendly technologies, projects, industries, or businesses. The term green finance can also be a narrower concept as a group of environmentally friendly financial products and services. However, the common feature of green finance activities is always focusing on the values of the natural environment and natural resources. Green finance seeks to improve social welfare and equity while reducing environmental risks and enhancing ecological balance. The concept of Green Finance can also encompass environmentally responsible investing and investing that addresses climate change.

Up to now, there have been many studies on green finance, including the following typical projects:

The UK Debt Management Office's Green Financing Framework (2021) mentions in the study the Government's role in leading on global climate and environment, by designing and delivering better, innovative financial services. more creative and effective. The publication provides assessments to select projects with the largest percentage of green spending. Assess the impacts on green project selection. The study also

announced legal considerations related to green finance. Green finance leads the direction of sustainable environmental development. Previously, in 2019, the UK also developed a green finance strategy to ensure sustainable growth and increased competition and also established the Green Finance Institute, a specialized agency for Green Finance. Also in this work, The UK announced in November 2020 that it will become the first major economy to introduce mandatory reporting of climate-related financial information across the economy by 2025 and classify environmentally friendly investment activities.

The United Arab Emirates (UAE) includes 7 states located at the southern end of the Gulf region. Oil and natural gas reserves allow the region to have a prosperous economy. However, the Arab Emirates also has strategies to limit climate change. According to Abu Dhabi Future Energy Company – Masdar PJSC (2023). Abu Dhabi Government Strategic Investment Company, the main purpose of the company's activities is to promote the development and deployment of clean energy solutions to meet local and regional sustainability challenges. and globally, and support the UAE's transition to a diverse and sustainable economy.

There are quite a few publications related to the overview of green finance. These publications revolve around how to finance green projects to reduce emissions and respond to climate change. At the same time, research policies regulating the use of green finance, etc. However, there has been no publication summarizing the issues of A Systematic Literature Review of Green Finance. The authors' research will focus on systematically evaluating the literature on green finance. To achieve research goals, we use VOSviewer 1.6.19 software. Accordingly, the research team asked the following questions: (1) What is the main time when articles about Green Finance are published?; (2) What concepts appear most often in these studies; (3) Which documents are cited the most?; (4) Who is the author with the most articles and citations?; (5) Which university has the highest number of articles and citations; (6) Which country has the highest number of articles and citations?

## II. RESEARCH METHODS

To collect general documents, the author searched Google Scholar for peer-reviewed academic articles with the keywords "Green Finance Review", and "Green Finance Literature" to learn about general research on Green finance

that has been done before, thereby finding a gap for this research.

Next, the author used VOSviewer 1.6.19 software to filter data with the keyword "Green Finance" filtered in the Abstract of the OpenAlex database, from 1931 up to now, accessed September 16, 2023 (Van Eck, N. J., & Waltman, L., 2011). The results were 2157 articles relate to. Based on this data, the author performed analysis

according to the following contents: (1) Number of articles about Green Finance published over time; (2) Concepts appear the most in these studies; (3) Most cited documents; (4) Author with the highest number of articles and citations; (5) The university has the highest number of articles and citations; (6) Country with the highest number of articles and citations.

### III. RESEARCH RESULTS

#### 3.1. Number of articles about Green Finance over time

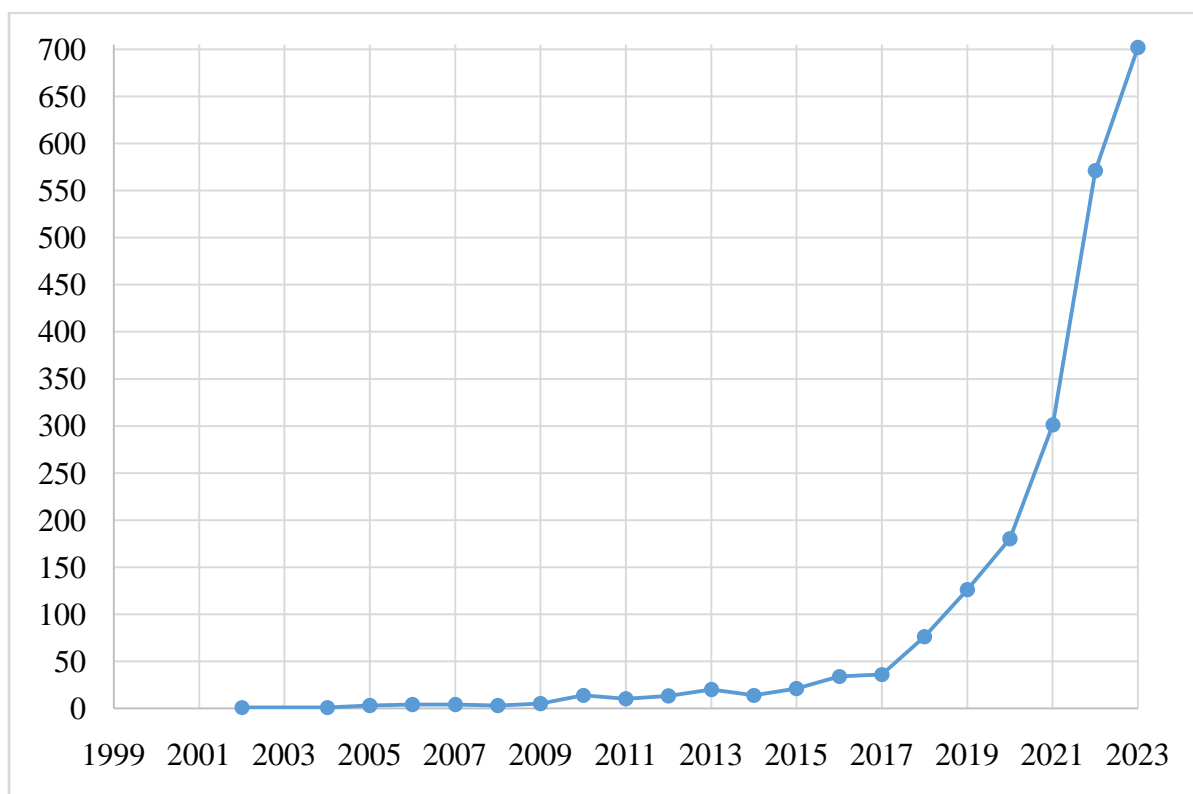


Fig. 1. Publication of Green Finance by Year

(Source: Authors compiled from VOSviewer software)

Green Finance was first known in the study of Hotelling, H. (1931) "The economics of exhaustible resources" (Data from OpenAlex). Subsequent studies mentioned it but were insignificant and intermittent from 1931 to before 2005. From 2005 to 2017, there were not many subsequent studies on this issue (from 3 to 35 articles). From 2018 to the present, green finance research has increased sharply in quantity, especially from 2021 to 2023, peaking in 2023 with 702 articles, as of September 16, 2023 (Fig. 1).

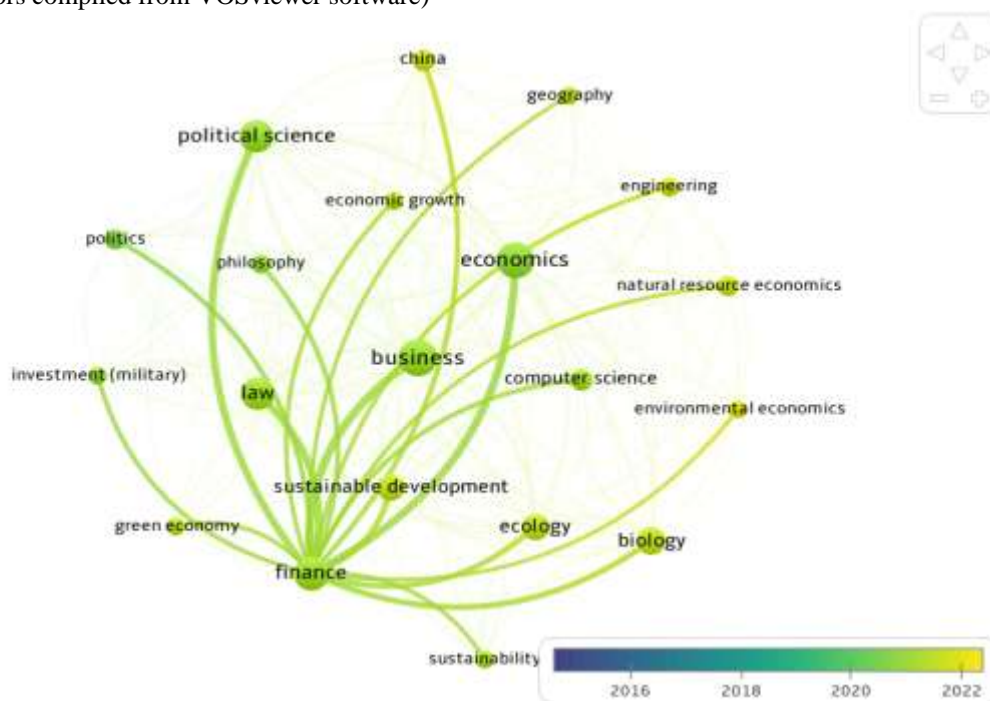
#### 3.2. Concepts appear the most

With the Keywords filtering mode with 300 appearances, we have found the 20 most used keywords in the Abstracts of Green Finance research. Keyword groups appear often related to fields such as business, economics, finance, and biology. In addition, green economy or sustainability is also of interest (Table 1).

**Table 1. Concepts appear the most**

Keyword	Occurrences	Total link strength
business	1824	12570
economics	1748	12435
finance	1512	10499
political science	1428	10919
law	1341	10704
biology	1014	8195
sustainable development	915	7872
ecology	913	7588
computer science	599	4240
china	598	4660
politics	509	4510
natural resource economics	496	4136
engineering	478	3613
philosophy	475	3634
geography	414	3020
green economy	401	3633
environmental economics	397	3365
economic growth	396	3365
investment (military)	392	3667
sustainability	375	3335

(Source: Authors compiled from VOSviewer software)



**Fig. 2. The appearance of keywords by year**

(Source: Authors compiled from VOSviewer software)

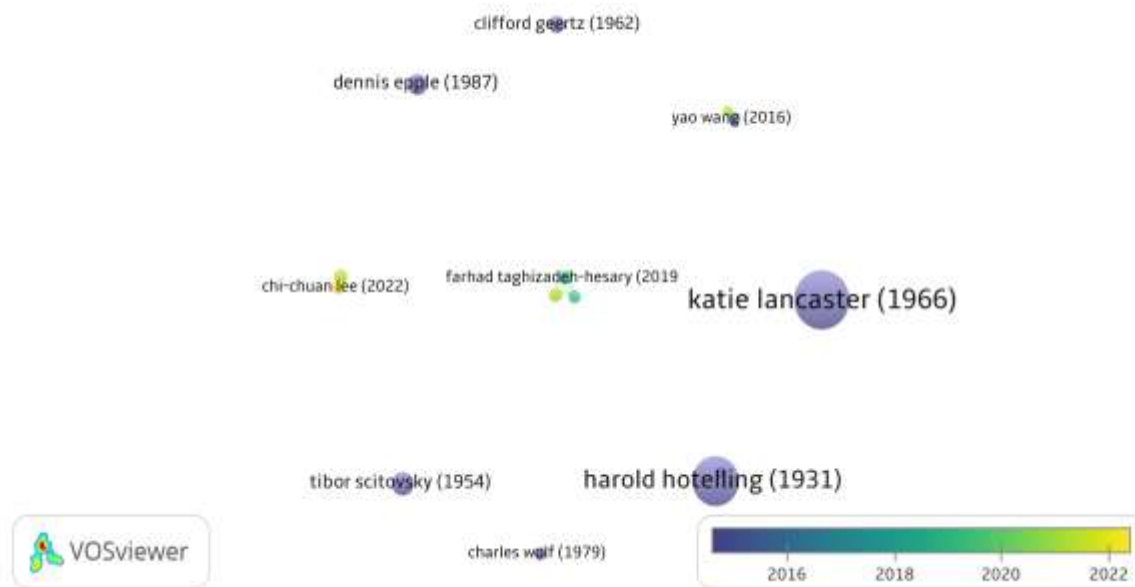
Figure 2 adds additional information about keywords by year. The most frequently appearing words are business, economics, finance, and political science, which appear a lot in the period

2020-2021. The remaining keywords that appear a lot in 2022-2023 are environmental economics, natural resource economics, and engineering.

**Table 2. Most cited documents**

Document	Citations
katie lancaster (1966)	5306
harold hotelling (1931)	3711
tibor scitovsky (1954)	893
dennis epple (1987)	686
clifford geertz (1962)	482
farhad taghizadeh-hesary (2019)	341
chi-chuan lee (2022)	335
dongyang zhang (2021)	329
chin-hsien yu (2021)	327
charles wolf (1979)	296
dayong zhang (2019)	276
yao wang (2016)	276
merton h. miller (1985)	211
shengling zhang (2021)	203

(Source: Authors compiled from VOSviewer software)



**Fig. 3. Most cited documents by year**

(Source: Authors compiled from VOSviewer software)

Looking by year, Figure 3 shows that documents by Lancaster, K. J. (1966), Hotelling, H. (1931), and Scitovsky, T. (1954) were all highly cited before 2016. Taghizadeh-Hesary, F., and Yoshino, N. (2019) were highly cited in 2019-2020, and Lee, C. C., and Lee, C. C. (2022) were highly cited in 2022-2023.

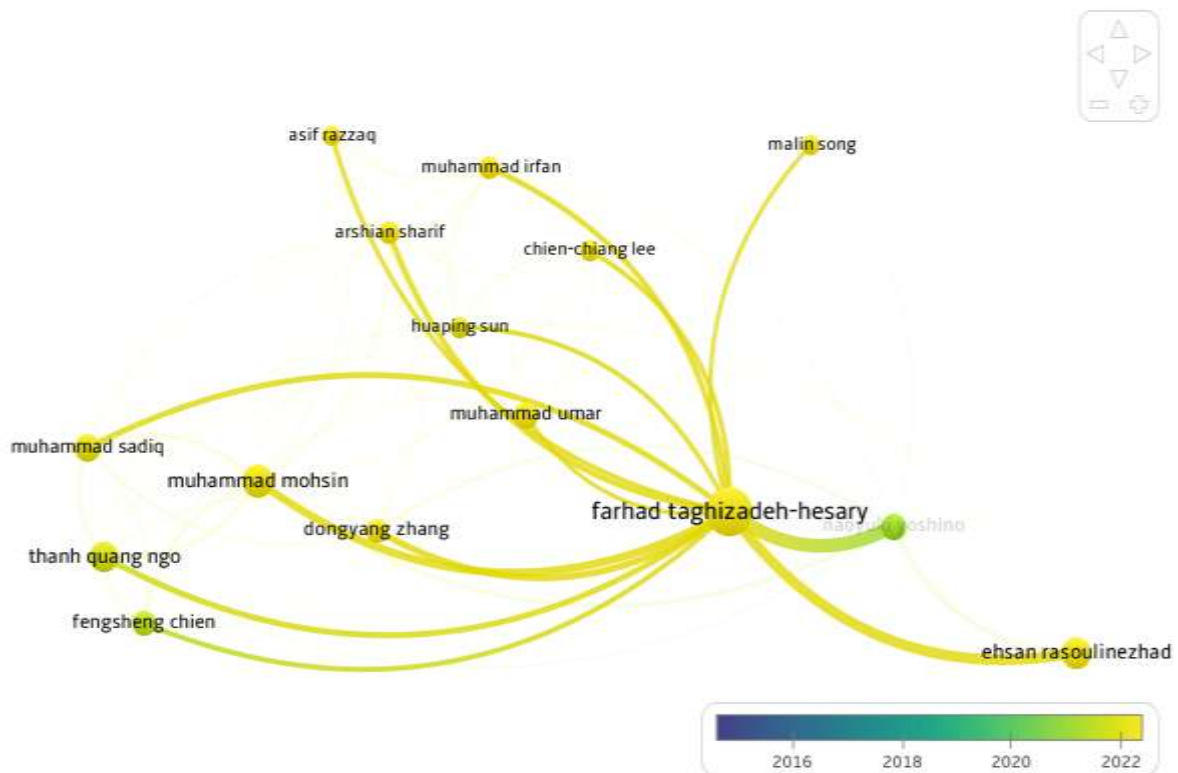
### 3.3. The author has the highest number of articles and citations

Filter the search for authors with 5 articles and 200 citations or more. The results are shown in Table 3. According to this criterion, the author with the highest number of articles and citations is Taghizadeh-Hesary, F. (37 articles, 1339 views), far ahead of subsequent authors. Next is Mohsin M. (16 posts, 821 views). The group of authors has several articles from 10-14 such as Rasoulinezhad E., Ngo T. Q., Sadiq M., Yoshino N., Umar M. The remaining authors have several articles from 5-9 articles.

**Table 3. Authors with the highest number of articles and citations**

Author	Documents	Citations
farhad taghizadeh-hesary	37	1339
muhammad mohsin	16	821
ehsan rasoulinezhad	14	230
thanh quang ngo	13	267
muhammad sadiq	11	299
naoyuki yoshino	10	608
muhammad umar	10	257
fengsheng chien	9	275
dongyang zhang	8	514
arshian sharif	7	447
muhammad irfan	7	261
chien-chiang lee	6	604
huaping sun	6	308
asif razzaq	5	310
malin song	5	213

(Source: Authors compiled from VOSviewer software)



**Fig. 4. Documents of authors by average publication year**

(Source: Authors compiled from VOSviewer software)

Figure 4 shows the number of articles reviewed by the author over time. Most authors published in the period 2022-2023 such as Taghizadeh-Hesary, F. Rasoulinezhad E.,. Some other authors published earlier, 2020-2021 such as Yoshino N., Ngo T. Q., and Chien Fengsheng.

### 3.4. Organization with the highest number of articles and citations

With search results for organizations with 10 articles and 300 citations or more, the results have 17 fields. Table 4 shows that the leading schools for publications on green finance include Tokai University of Japan (35), Southwestern

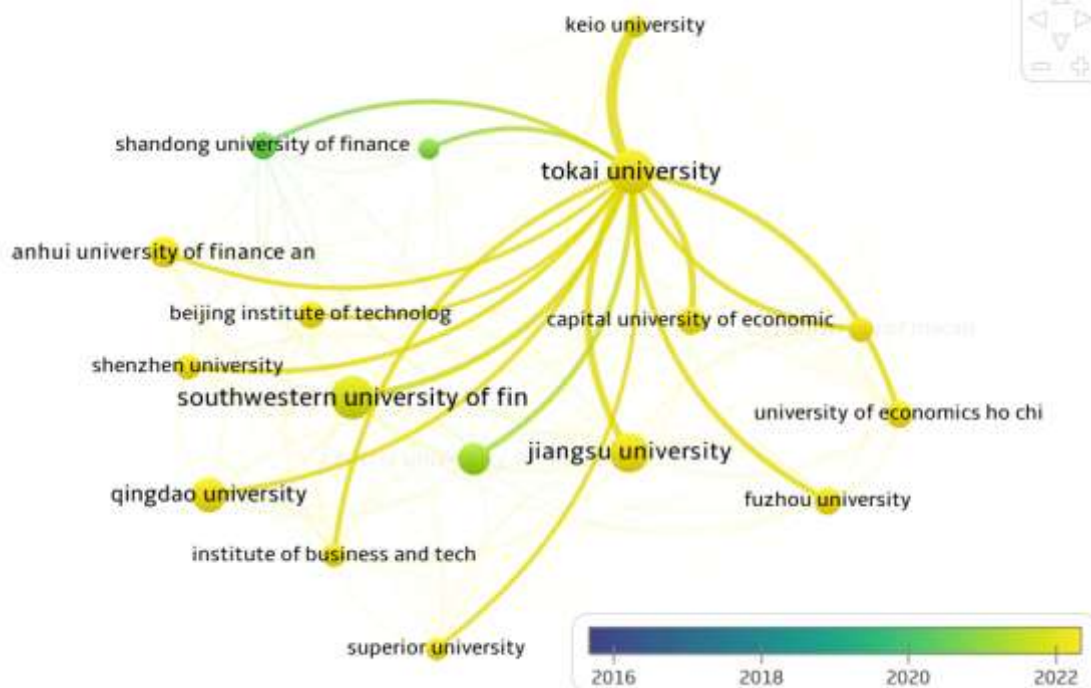
University of Finance and Economics of China (33), Jiangsu University of China (29), Qingdao University of China (23), and Central University of Finance and Economics of China (20). The second group includes schools with 15-19 articles such as Anhui University of Finance and Economics

(China), University of Economics Ho Chi Minh City (Vietnam)... The remaining universities in this group have 10-10 articles. 13. Thus, most publications belong to the majority of Chinese universities.

**Table 4. Organizations with the highest number of articles and citations**

Organization	Documents	Citations
tokai university	35	999
southwestern university of finance an...	33	1184
jiangsu university	29	1092
qingdao university	23	425
central university of finance and econ...	20	456
anhui university of finance and econ...	19	376
beijing institute of technology	15	796
capital university of economics and b...	15	585
university of economics ho chi minh ...	15	359
shandong university of finance and e...	15	350
fuzhou university	15	337
shenzhen university	13	411
city university of macau	13	368
institute of business and technology	12	584
keio university	11	565
superior university	11	470
hong kong polytechnic university	10	396

(Source: Authors compiled from VOSviewer software)



**Fig. 5. Documents of the university by average publication year**

(Source: Authors compiled from VOSviewer software)

Looking over time, the number of articles published by schools is mainly in the period 2022-2023, consistent with the explosion of research on green finance as shown in Figure 1. A small number of schools have published articles. in 2020-2021 as Shangdong University of Finance and Economics (China), Hong Kong Polytechnic University, and Central University of Finance and Economics (China).

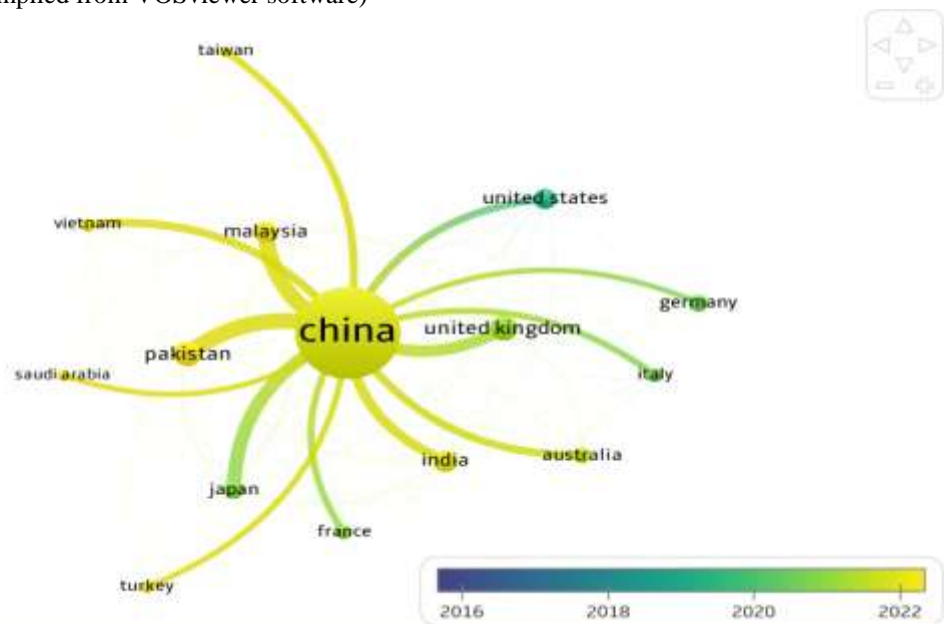
### 3.5. The country with the highest number of articles and citations

Filtering with countries that have 15 articles on green finance and 300 citations or more, results in 15 countries (Table 5). This result shows that the country with the highest number of articles and citations is China (867 articles, 12,112 views), far behind the top 15 countries. The next two countries are the United Kingdom (95 articles) and Pakistan (94 articles). The third group of countries is India, the United States, Malaysia, and Japan. The remaining countries have articles from 21 to 53 and citations over 300, including Vietnam.

**Table 5. Countries with the highest number of articles and citations**

Country	Documents	Citations	Total link strength
china	867	12112	4032
united kingdom	95	1317	827
pakistan	94	2159	1308
india	76	543	649
united states	70	4376	361
malaysia	68	1819	1165
japan	59	1845	877
germany	53	323	204
australia	43	763	379
italy	37	510	304
france	35	536	261
vietnam	30	651	420
turkey	24	300	219
taiwan	23	343	259
saudi arabia	21	344	235

(Source: Authors compiled from VOSviewer software)



**Fig. 6. Documents of the country by average publication year**

(Source: Authors compiled from VOSviewer software)



Fig. 6 provides additional information on country announcements over time. Countries announced in the 2018-2020 period include the United States, United Kingdom, Germany, Italy, Japan, and France. The remaining countries will be announced mainly from 2022-2023.

#### IV. CONCLUSION

Based on the OpenAlex database of Vosviewer 1.16.19 software, we statistically analyzed research on the keyword "green finance" filtered in the Abstract, obtaining 2,157 articles. From this document, we performed a descriptive statistical analysis of the number of articles published over time, Most appearing Concepts, Most Cited Documents, Authors, Universities, and Countries that have the highest number of articles and citations on Green Finance. Statistics show that research on Green Finance has been conducted since 1931 by Hotelling, H. "The economics of exhaustible resources", however, research on this issue is not much, until now. 2018 increases gradually and strongly from 2021 to 2023, 2023 alone has 702 articles as of September 16, 2023.

The most cited documents include pioneering and long-standing publications such as Lancaster, K. J. (1966) with "A new approach to consumer theory", Hotelling, H. (1931) "The Economics of exhaustible resources", Scitovsky, T. (1954) "Two concepts of external economies". However, with the recent explosion of research on Green Finance, new articles with impressive citations include Taghizadeh-Hesary, F., and Yoshino, N. (2019), Zhang, D. et al. (2021), Yu, C. H. et al. (2021) and Lee, C. C., and Lee, C. C. (2022) both from China.

The author with the most articles and citations is Taghizadeh-Hesary, F. (37 articles, 1339 times), far ahead of the following authors, followed by Mohsin M. (16 articles, 821 times). The university with the most articles and citations is Tokai University of Japan (35 articles). However, the group of organizations with the most publications on green finance is mostly from China, in addition to some countries such as Japan and Vietnam. Similarly, the country with the highest number of articles and citations is China (867 articles, 12,112 views), far behind the top 15 countries such as the United Kingdom, Pakistan, Japan, and Vietnam...

Thus, with systematic statistical results from academic data on Green Finance, the study has added to the literature review, serving as a basis for future reference studies. However, research is still limited due to limited data collection. Expanding statistics from larger

databases such as Google Scholar is also a suggestion for future research.

#### REFERENCES

- [1]. Böhnke, E., Knierim, R., & Röber, V. (2015). How to make green finance work—empirical evidence from bank and company surveys. Bonn: DIE, forthcoming, 20, 56-10.
- [2]. Epple, D. (1987). Hedonic prices and implicit markets: estimating demand and supply functions for differentiated products. *Journal of Political Economy*, 95(1), 59-80.
- [3]. Hotelling, H. (1931). The economics of exhaustible resources. *Journal of Political Economy*, 39(2), 137-175.
- [4]. Höhne, Khosla, Fekte, Gilbert (2012) Mapping of Green Finance, Dlevered by IDFC Member, Ecofys
- [5]. Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of Political Economy*, 74(2), 132-157.
- [6]. Lee, C. C., & Lee, C. C. (2022). How does green finance affect green total factor productivity? Evidence from China. *Energy Economics*, 107, 105863.
- [7]. Lindenberg, N. (2014). Definition of green finance. In *Definition of Green Finance: Lindenberg, Nannette*. [SI]: SSRN.
- [8]. Masdar PJSC (2023). Masdar Green Finance Framework
- [9]. Scitovsky, T. (1954). Two concepts of external economies. *Journal of Political Economy*, 62(2), 143-151.
- [10]. Siddhesh Shinde (2023). How Does Green Finance Benefit Organizations and the World, accessed on 10/09/2023, <<https://emeritus.org/blog/finance-what-is-green-finance/>>.
- [11]. Taghizadeh-Hesary, F., & Yoshino, N. (2019). The way to induce private participation in green finance and investment. *Finance Research Letters*, 31, 98-103.
- [12]. Tran T. T. T, Nguyen T. H. L, (2016). Finance Green banking, green accounting, international experience & Implications for Vietnam, Hanoi National University Publishing House.
- [13]. UNEP. (2013). Recent trends in material flows and resource productivity in Asia and the Pacific.
- [14]. UK Government, (2021). Green Financing Framework, accessed on 12/09/2023 <<https://assets.publishing.service.gov.uk/g>

- overnment/uploads/system/uploads/attachment\_data/file/1002578/20210630\_UK\_Government\_Green\_Financing\_Framework.pdf>
- [15]. Yu, C. H., Wu, X., Zhang, D., Chen, S., & Zhao, J. (2021). Demand for green finance: Resolving financing constraints on green innovation in China. *Energy Policy*, 1 (53), 112255.
- [16]. Van Eck, N. J., & Waltman, L. (2011). *VOSviewer manual*. Manual for VOSviewer version, 1(0).
- [17]. Zhang, D., Mohsin, M., Rasheed, A. K., Chang, Y., & Taghizadeh-Hesary, F. (2021). Public spending and green economic growth in BRI region: mediating role of green finance. *Energy Policy*, 153, 112256.