Nat. Volatiles & Essent. Oils, 2022; 9(1): 2032-2042

NVEO
Natural Volatiles &
Essential Oils

A Systematic Review On Green Finance A Measure For All Environmental Problems

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Abstract

Green finance is an emerging topic in today's pollution-filled world. It is about integrating finance and the environment. Green finance has a wide variety of scope ranging from environmental protection to achieving sustainable development goals to increasing the firm performance. Green finance is related to climate finance but it has a wider scope for environmental finance like pollution control, waste management, renewable energy, and many more. However, due to very complexities ranging from definition to practical implication of the concept, it is an equally controversial subject as it is important. Green finance has garnered momentum after Paris Agreement on Climate Change 2015. The systematic review has been carried out by searching available literature in the Web of Science and Scopus database in January 2022 revealed that there are a total of 1619 articles that discussed the relationship between green finance and environmental effect. A total of 14 articles out of 1619 were selected for the study. The articles based on the empirical evidence are only taken into consideration for finding out how green finance has been contributing to solving the problem of the environment. The study concluded there was very little empirical research being carried out on green finance in solving the world's environmental problems**.** Among the available empirical evidence, most of the study has been carried out in China. Green finance has delivered what it has been expected to deliver. Green finance has enhanced the ecological environment and helped to reduce carbon dioxide (CO2) emissions.

Keywords: CO2 emissions, Environment, Green finance, Systematic review, Paris Agreement

Background:

The world we live in today is highly polluted. The global temperature is rising, the ecological environment is changing, the climate is changing unexpectedly due to high carbon emissions. The economic growth is not sustainable because the growth has been heavily skewed in favor of the rich and has been environmentally destructive. The world's greatest environmental threat is climate change. (Sachs and Du Toit 2015) decisive action is yet to take if the governments have to keep global warming below 2ºC as per the agreement. Finance has been a powerful enabler of human progress after industrial evolution. The purpose of the financial system is to allocate funds from the surplus unit and to the deficit unit for productive uses. When the financial system works properly then the GDP of the country rises which ultimately increases the living standard of the people but it does not work properly then the funds are channeled into real estate bubbles and harmful projects that exacerbate the human induces climate change (Sachs et al., 2019). The finance which finances the climate change is generally considered green finance but the finance is not only limited to climate change finance but also covers a wide area of environmental finance. Green finance includes financial products that protect the environment from pollution, balanced ecology, and unexpected nature change.

Green finance is one of the controversial topics around the world. It is a hot topic that requires a serious and practical study rather than empirical research based on the theoretical background. Besides its importance and necessity in today's world, this has been neglected for many years. Green finance was in shadow for years until the rise of the Paris Agreement 2015. Green finance is still in the developing stage so there is no clear meaning of green finance. But generally, green finance is defined as any structural financial activity that has been developed for a better environment. In other words, a product or service invented to have a better environment outcome is defined as green finance. Green finance is blossoming slowly as the world has felt the necessity of green finance. Green finance generally includes but is not limited to loans, debt mechanisms, and investments that are used to encourage the development of green projects to minimize the impact of more regular projects. Green finance is a phenomenon that conglomerates finance and business from the perspective of the environment (Wang & Zhi, 2016).

Green finance refers to green investment to control environmental pollution aiming to reduce the environmental damage of enterprise and realize sustainable development. The investment is made by both the public and private sectors in energy consumption and environmental protection. Green finance means different to different people but the major objective is to preserve the environment with better integration of financial incentives. In comparison to traditional thoughts, green finance is more about ecology and environmental protection. It is an arena for many stakeholders like investors, producers, consumers, governments, the national and international organizations at large (Yu et al., 2021). Green finance is essential in financing renewable and green energy projects to reduce carbon emissions and their negative health impacts and ensure environmental sustainability. According to (Zhang, 2018), energy finance is categorized broadly into six themes: pricing mechanism, energy and financial markets (Zhang, 2018); pricing mechanism (Zavadska et al., 2018); energy corporate finance (Ghouma et al., 2018); green finance and investment (Sachs et al., 2019a); Taghizadeh-Hesary & Yoshino, 2019); energy derivative markets (Ji et al., 2020) and energy risk management (Zheng et al., 2021). Green finance integrates environmental protection with economic profits emphasizing two controversial issues "green'' and "finance". The study on green finance lacks detailed studies regarding mechanism exploration, market research, and policies. Green finance has been emerged as a new means of environmental governance and has been rapidly developing around the world.

Problem Identification:

Green finance is a hot topic and is gaining huge attention in the field of research around the world (Zhang et al., 2021). There have been billions of dollars being spent on then finance being United states at the top (Reuters, 2021). Still, it is unclear whether the money spent on green finance has contributed to resolving environmental problems. There has been much research around the world regarding the policy implementation, instruments of green finance, government role but empirical evidence is lacking in this field. The empirical evidence depicts a clear picture regarding to what extent green finance has solved or has the capacity to solve environmental problems.

Objectives:

The primary objective of the paper is to find out empirical shreds of evidence regarding green finance in resolving environmental issues.

Scope: The Paris Climate Agreement 2015 accelerate the growth of green finance in terms of investment and works of literature. Green finance does not only include the climate finance. There are many more aspects that the green finance covers which the academicians, practitioners should incorporate.

Significance of the study:

Environmental degradation is the major issue the world is facing today. Green finance is considered to be the major weapon in developing the ecological environment and its importance has been increasing in fighting against the environmental challenges. Therefore, the study could be significant to all the academicians, industrialists, governments, UN agencies, and many more.

Methodology: The study has been conducted applying the systematic review methodology. The various articles were reviewed and analyzed to find out whether the green finance is a measure of all environmental problems.

Data Sources

In this study, we present a systematic literature review of green finance as a measure for all environmental problems following the PRISMA statement for systematic reviews. The relevant works of literature were searched using the Web of Science (WOS) and Scopus database using the keywords green finance, Climate finance and green bonds. The time span for the literature search is from 2015-to 2022 because the study on the green finance accelerated after the Paris Agreement 2015. The other search criteria were the articles published in the journal and in the English language only.

Inclusion and exclusion criteria

This study mainly focused on the impact of green finance on environmental benefits. As such the inclusion criteria for the articles were the reduction of carbon emissions, pollution control, and protection of the ecology system. The articles based on empirical evidence were only selected for the study. The search result included many articles that only explain the relationships between green finance and environmental regulations and policies rather than the environmental benefits of green finance. There were also articles that solely focuses on the development of green finance its opportunities and challenges. Those articles were excluded from the study. This study also excluded the articles that were not published in English.

Results:

The flow diagram of identifying eligible articles for this study is shown in Figure 1. The literature searches resulted in a total of 1,613 articles out of which 604 duplicates were removed using Zotero software. The remaining 1,009 articles were then initially screened based on the titles and abstracts. The inclusion and exclusion criteria described in the previous section were followed in the screening process resulting in the exclusion of 917 articles. The remaining 92 articles were then downloaded and reviewed in full text, and an additional 75 articles were excluded because they primarily focused on saying green finance is important for environmental benefits but does not have empirical evidence to prove the statement. Out of 75 articles, only 14 articles met the inclusion criteria out of which 13 articles were published in the year 2021.

Figure 1: Flow Diagram

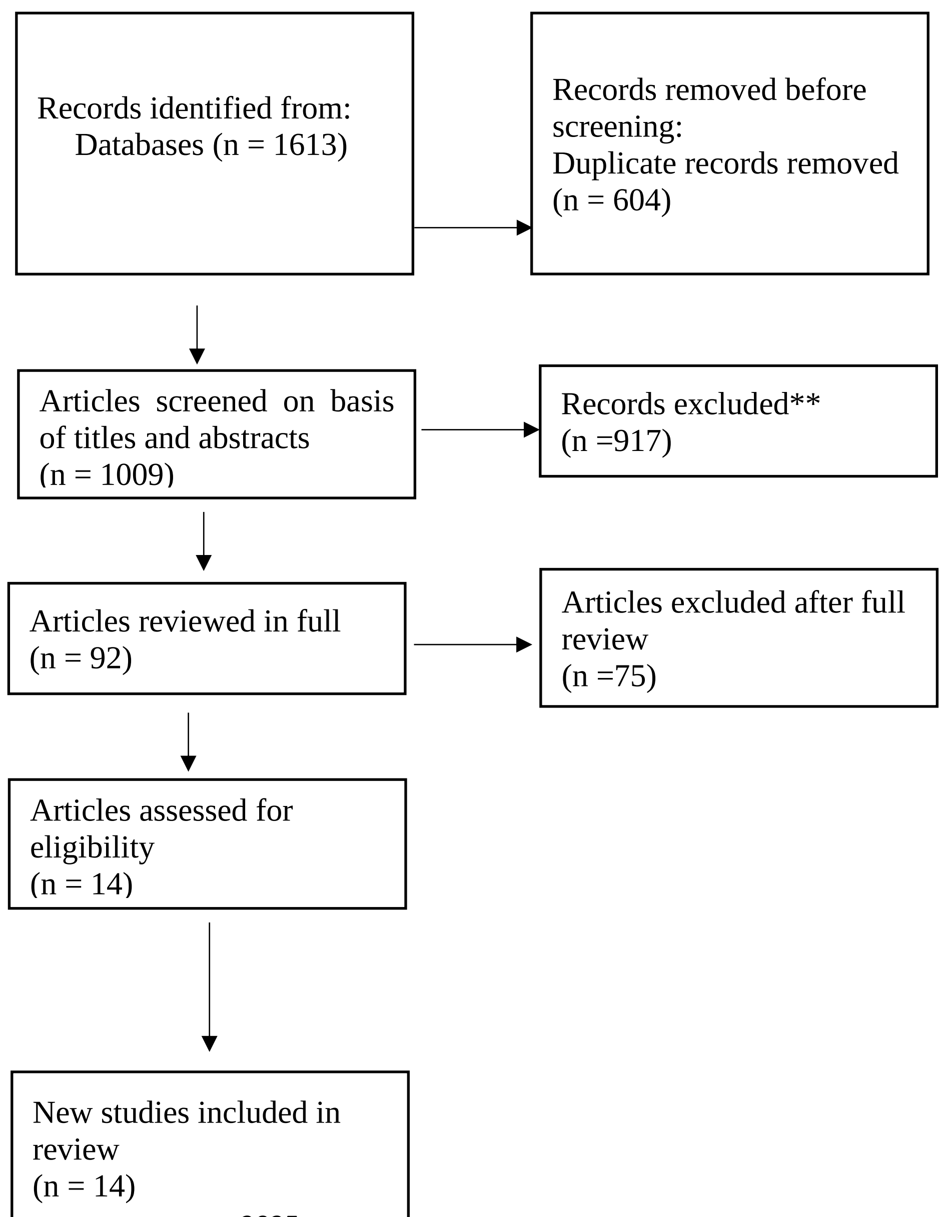

Table 1: Summary of Reviewed Articles

Authors	Country	Topic	Methodology	Findings
Yang, Xiang, Shuangliang (2021)	China	Nexus between green finance, fintech and high-quality economic development: Empirical Evidence from China	Generalized method of moments (GMM)	High-quality economic development focuses on 3 aspects ecological environment, economic efficiency and economic structure. Green finance is found to have positive impact on ecological environment
Zhou and Xu (2021)	China	Research on the impact of green finance on China's regional ecological development based on system GMM model	Generalized method of moments (GMM)	The green finance has an impact on ecological development. The rising level of green finance will inhibit the improvement of ecological development
Meo and Karim (2021)	Top 10 economies	The role of green finance in reducing CO2 emissions: An Empirical Analysis	Quantile on Quantile Regression (QQR)	Green finance is the best financial strategy to reduce CO2 emissions. There is a negative relationship between them.
Zakari and Khan (2021)	11 top countries	The introduction to green finance: A curse or benefit to environmental sustainability	Generalized Least Square model	Green finance is associated with environmental sustainability. Increase in green finance reduces the environmental degradation
Khan, Riaz, Ahmed and Saeed (2021)	26 nations of Asia	Does green finance really deliver what is expected? An empirical perspective	Ordinary Least squares baseline model	Green finance quantified as climate mitigation finance reduced the ecological footprints. From Asian perspective, green finance delivers as anticipated
Huang and Chen (2021)	China	The spatial spillover and threshold effect of green finance on environmental	Spatial Durbin Model (SDM)	Green finance and environmental quality have significant positive spatial autocorrelation. Green

		quality: Evidence from China		finance improves the quality of the environment.
Li and Gan (2021)	China	The spatial spillover effects of green finance on ecological environment-empirical research based on spatial econometric model		The development of green finance promotes the improvement of the ecological environment and it has a positive spatial spillover effect.
Li, Liu, Hou, Xu and Chou (2019)	China	The study of the Impact of Carbon Finance Effect on Carbon Emissions in Beijing-Tianjin-Hebei region- Based on Logarithmic Mean Divisia Index Decomposition Analysis	Logarithmic Mean Divisia Index Model	There is a variation in effects of carbon finance in reducing carbon emissions in these regions but to some extent it is found that the carbon finance can reduce the carbon emissions
Wang, Lei, Zhao, Long and Wu (2021)	China	The dual impacts of green credit on Economy and environment: Evidence from China	Econometric models	Green credit is negatively correlated with environmental pollution which means employing green credit lessens the environmental pollution
Zhang, Hong, Li and Li (2021)	China	An examination of Green Credit Promoting Carbon Dioxide Emissions Reduction: A Provincial Panel Analysis of China	Linear regression model	The green credit impact on reduction of CO2 emissions is not valid in all regions. Except western and northeastern regions the green credit has played a role in reducing CO2 emissions.
Chen and Chen (2021)	China	Can green finance development reduce carbon emissions?	Spatial Dynamic Panel Model	The development of green finance leads to the reduction of carbon emissions as it reduces

		Empirical evidence from 30 Chinese Provinces		financing constraints and boost green technology innovation.
Wang, Cai and Elahi (2021)	China	Do green finance and environmental regulation Play a crucial role in the reduction of CO2 emissions? An empirical analysis from 126 Chinese cities		
Hu and Zheng(2021)	China	Is green credit a good tool to Achieve "Double Carbon" Goal? Based on Coupling Coordination Model and PVAR Model?	Coupling Coordination Model and Panel Vector Aggression Model	Green credit is an effective tool to achieve double carbon goal. Green credit inhibits the increase in carbon emissions.
Zhou and Zhang (2020)	China	Impact of green finance on economic development and environmental quality: a study based on provincial panel data from China	Regression Analysis	Green finance plays an important role in improving the environment quality. Environment quality variables are industrial smoke dust, industrial solid waste and carbon dioxide

Analysis and Findings: Green finance has been adopted as a financial strategy for the sustainable economic development and ecological environment around the world (Cheung and Hong 2020). Economic development comes with the cost of environmental degradation (Li et al., 2016). Although the green finance is developed a lot in emerging economies it is still unclear regarding the extent to which it promotes the high quality economic development. High quality economic development refers to sustainable and healthy economic development, pursuing a sustainable ecology and a happy society for people while developing the economy (Gu et al., 2021). In the long run the real GDP and urbanization have a positive impact on emission in the long run (Adebola Solarin et. Al. 2017).

The empirical researches have mostly been carried out in China. China fast economic growth has made the excessive uses of the natural resources polluting the environment (Li.et. al 2016). In China the adopted green finance has played a very critical role in improving the ecological environment along with the sustainable development of the economy (Akomea-Frimpong et al., 2021; Cheung and Hong, 2020; Sachs et al., 2019). The empirical evidence has showed that the green finance has helped in improving the quality of the environment along with the sustainable economic development (Zhou and Zhang). Green finance effectiveness is measured in terms of solving environmental problems (Zhou et. Al.) the green finance in China has gained much popularity and exhibited a huge development in China. Green finance helps to improve ecological environment in 3 ways: helps to get a sizeable loan (Shu et. Al. 2016), supervise the whole process guaranteeing the meeting of green standards (An et. Al. 2021) and guides the green consumption of fossil fuel (Ren et. Al., 2020). Green finance helps in reducing the carbon emissions (Hu and Zheng, Chen and Chen, Zhang, Hong, Li and Li, Meo and Karim). To achieve the balance between man and nature the economic development of China must be achieved balancing the ecological environment (Zhou and Xu 2021). Green finance enhances the development of globalization and promote the ecological environment only when the green finance development reaches to a certain scale (Zhou and Xu 2021). Although the green finance contributes the improvement of ecological the contribution varies from level of economic development and level of green finance development (Yan and Liu, 2018). Green finance has led to the significant reduction of industrial gas emissions (Muganyi et al., 2021). Green finance has been expected to play an important role in the attainment of the climate change goals outline in the Paris Agreement. Huge upfront capital investment is required for the environment protection so the green finance is the one which helps in financing the protection of environment.

Discussions: Green finance has been used in synonymous with climate finance, carbon finance, green bonds, green instruments (Meo and Karim 2021). The real term of what green finance and how and in what sense it must be used has been still in a shadow. There are many environmental problems that the world is facing today but the review articles focuses more on Carbon dioxide emissions and the industrial wastage pollution. From the review it has been seen that the green finance go hand in hand with the economic development. To invest in a green finance by the private sector there must be sustainable economic development.

The Paris Agreement has been signed to combat the climate change worldwide. To combat the climate change worldwide 53 trillion dollars are needed to maintain 2-degree temperature by 2035. As per the Environmental Think Tank Climate Policy Initiative report 2021, the annual spending on global climate finance is $632 billion over 2019 and 2020 which is huge. The billions of dollars that has been spent and the dollars that has been planned to spend in the coming year will be of no value if it could not fight the climate change.

The empirical study on the impact of green finance on environmental problems is very scarce. There were many articles focused on policies and suggestions that the government of a particular to come up with regarding green finance. Since 2015 millions of dollars have been spent in reducing CO2 emissions but there have not been empirical literatures that could actually prove to actually deliver what have been expected from it. Also, the empirical research has been more concentrated in China. There are European countries who spend millions in green finance also the United States but the actual impact has not been tested so far. Huge sum of money is required to finance the green projects and combat the environmental problems. Nearly 200 countries have committed to mobilize the green finance under the Paris Agreement on climate change 2015.

The environmental problems are many on the planet ranging from global warming, acid rain, air pollution, urban sprawl, waste disposal, ozone layer depletion, water pollution, climate change and many more. Green finance is targeted to solve the environmental problems that the human world is facing today. After reviewing the articles, it has been found that the green finance is interchangeable used as climate finance for combating the climate change or reducing CO2 emissions.

Research Gap: There is very limited literature and as well a very huge gap regarding whether the green finance is a measure of all environmental problems. United States being the top country spending in green finance but there is not even a single empirical study conducted whether the green finance is able to reduce the environmental problems of the United States.

Conclusion:

There have been many theoretical reviews about the importance of green finance in solving the various environmental issues but very few empirical evidences. The systematic review has been carried out with the help of 14 articles after meeting the inclusion criteria set in the study. Out of these 12 articles were published in the year 2021 which basically means there is an immense potential to be explored in the future regarding this issue. It is believed that this study provides a better insight and understanding regarding the subject matter and its essence in the field of literatures.

Green finance has tremendous environmental benefits ranging from reduction of greenhouse gas emissions, carbon emissions and many more There are very few studies which have empirically examined the impact of green finance in solving the environmental problems of the world. The Paris Agreement 2015 primarily focused on combating the climate change with the help of green finance. Since then, billions of amounts have been spent in green projects it is necessary to find whether the money spent in green project is delivering its value or not.

Limitations:

This study on systematic review on green finance as a measure for all environmental problems has been carried in order to find out the impact of green finance in eliminating various problems of the environment. For this purpose, only the empirical evidence research articles published in journal has been considered. The articles not written in English language has been excluded from the study. Furthermore, dissertations, UN environment and ADB working paper has not been included which could be the better source of information as well. Also, the articles based on the secondary data sources were also not taken into consideration.

Future Scope:

The main aim of the paper is to find out whether the investment in a green project have delivered the environmental benefits that has been expected. The study found out the empirical study on impact of green finance in solving the environmental problems is very few. There are not sufficient articles to exactly determine the impact of green finance in solving the environmental problems. Out of 32 reviewed articles, 90% of the study has been carried out in the states of China. So, future research can be carried out in other parts of the world like, United States, Denmark, Europe, India, Japan, and so on because these countries have also been spending on green finance since decades. The future research can be carried out showing the parallel effect of green finance on the environmental benefits in association with the Paris Agreement 2015.

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