

Green Finance's Role in Carbon Emission Management Efficiency

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Abstract. Green finance and carbon emission management are critical to addressing global climate change and achieving sustainable development. In the context of real-world challenges, the intensifying global climate crisis has heightened the focus on carbon emissions among governments, corporations, and financial institutions. The Paris Agreement and national carbon neutrality goals have propelled green finance into the spotlight as an essential economic tool. Green finance, through mechanisms such as green bonds, green loans, and ESG (Environmental, Social, and Governance) investments, supports the financing and implementation of environmental projects. This not only aids companies in transitioning to low-carbon operations but also enhances the overall sustainability of the economy. Carbon emission management is a vital strategy for businesses striving for sustainability. So this study explores the role of green finance in fostering good corporate carbon emission management. This study first discusses the current severe environmental issues related to carbon emissions in both China and overseas to highlight the importance of green finance. Then the article shows the basic theories of green finance and its development across the globe. Finally, some previous research was cited a specific way and finally, the conclusion was drawn that green finance makes corporate carbon emission reduction efficient, and then the study shows what can people do to further promote green finance.

Keywords: Green finance; carbon emission management; sustainable development.

1. Introduction

With temperatures rising today, how can people face the damage caused by temperature change? According to the literature, carbon emissions from fossil fuel combustion will reach a record high in 2023, and if no changes are made the temperature will rise again [1]. The main emitting countries are China, the United States, and India, of which China is the largest carbon emitter, and these countries' carbon emissions have remained high due to their high dependence on fossil fuels. Of course, there are other factors contributing to the high growth in carbon emissions, including a significant slowdown in economic development due to the ongoing impact of the 2020 pandemic, which led to a rebound in carbon emissions in the years following the pandemic and the recovery of the economy.

On the other hand, green finance plays an important role in carbon emissions. The development of green finance requires not only policy support but also international cooperation to strengthen the autonomy of green finance. From the perspective of policy support, the United Nations and local governments have attached great importance to green finance, while from the perspective of international cooperation, the Paris Agreement has increased the space for green finance development and autonomy, so that it will not be an industrial structure dominated by the government. Then the basic core of green finance is green bonds and green loans, through the two sides of the fund to promote the sustainable development of environmental protection projects, green bonds, and green loans are specifically used for renewable energy, energy saving, and emission reduction, environmental protection, low carbon management and other projects, in such a system can directly reduce the fossil fuels for the earth's pollution and thus reduce carbon emissions. Moreover, promoting the development of green finance is also optimising the industrial structure and

technological development, so that the backward industries can be transformed into green industrial chains, protecting the environment and increasing the total amount of the economy at the same time.

Policy support and international co-operation are key factors in the promotion of the green economy, and many countries have formulated green finance policies to encourage financial institutions to increase their investment in environmental protection projects. In China, for example, the Chinese government has introduced a series of policies to support the development of green finance, encouraging banks to provide loans for green projects and to strengthen the construction of environmental protection and low-carbon emission areas [2]. The carbon emission targets of A-share listed companies in China from 2001 to 2020 show that green finance can reduce carbon emissions by upgrading industrial structures and technological progress, and that this goal can be further achieved through market supervision [2]. Environmental protection can be achieved through local green finance political policies and international cooperation. Finally, the main research objective of this paper is to reduce carbon emissions through the realisation of green finance, and it is discussed and summarised in depth according to the relevant content.

2. Previous Cases of Green Finance's Influence on Carbon Emission

As the importance of green finance is highlighted, the point that green finance is useful in corporate carbon emission management is also demonstrated in the previous cases.

2.1. Financial influence on Green Finance in Carbon

Since green finance aims to balance economic profits and environmental benefits, that means during the process of implementing green finance, making financial resources accessible to enterprises all the time is deemed necessary and how many financial resources are mobilized in green finance will directly influence the efficiency of reducing carbon emission, so financial constraints is thus taken into account.

The influence of financial constraints on companies' efforts in implementing green finance or innovation was examined in a case of research carried out by a research team led by Yu. According to the results, if companies are situated where there is a higher level of green finance development, public policies will have a greater influence on green innovation. This case not only highlights the importance of not only financial support but also the proper design of governmental policies to foster corporate green finance to achieve goals of sustainable development like carbon emission reduction [3].

Another previous research carried out by a team led by Zhong had indicated that there is significantly negative association between green finance and carbon risk. It means green finance reduces carbon risk. In the meantime, the result indicated the higher the level of finance constraints is, the less efficient it will be to reduce corporate carbon risk through green finance [4].

The two cases mainly involve 3 variables: green finance, carbon risk, and financial constraints. To start with, cited cases indicated that the investment green finance can alleviate carbon risk, and then both of cases highlighted the impact of financial constraints in green finance's role in carbon risk alleviation. The two cases not only showed the importance of green finance to achieve corporate sustainable development through effective carbon emission development, but also emphasized the financial support in the implementation of green finance that depends on governmental policies and public needs so that economic resources can be properly mobilized in fostering green project.

2.2. Green Finance Reduces Carbon Intensity through Better Management

It is corporations that implement green finance and during the process, human capability will play an important role. So corporate management by human is key to the decision-making in planning and managing green finance to achieve carbon emission reduction, an efficient management and good profession within a team will also help to boost the implementation of green finance.

The mediating role of better management in the association between green finance and carbon emission reduction was found in another case of research conducted by Liu. The result show that companies with executives who have foreign experiences can significantly reduce corporate carbon emissions. Corporate green innovation plays a mediating role in the process of the influence of directors' foreign experiences on corporate carbon emissions. Heterogeneity analysis finds that the reduction of corporate carbon emissions caused by foreign experiences is more significant in state-owned enterprises [5].

Another experiment led by Jin indicated that corporate green finance negatively influences carbon emission intensity. Then, Green finance, which is strengthened by management shareholding can enhance its negative influence of reducing carbon emission intensity. Finally, In the aspects of management stability and environmental background executive power (Epower), the results indicated that corporate green investment, fostered by team management stability or the proper use of environmental background executive power, can also enhance it's negative influence of reducing carbon emission intensity for companies [6].

The two cases mainly involve 3 variables: green finance, carbon emission or intensity and management efficiency. Similarly, the results indicated the green finance can alleviate corporate carbon intensity or emission, and what helps to enhance green finance' role is the efficient corporate management like the consistency of reaching goals of carbon emission reduction in the two kinds of relations (the company management and shareholders, the cohesion within management team) and the capability of corporate management (like proper use of executive power and related knowledge and experiences). The two cases above not only show the importance of green finance in corporate carbon emission management efficiency but also highlight the needs that company manager should make efforts to take care of various internal relations properly and focus on the cultivation of specialized environmental background so that green finance can be implemented successfully. After all, the cohesion within a team, the proper use of power, and the qualification of staff will significantly influence a group's decision making.

2.3. Discussion of Cited Cases

All of 4 cited cases explore the influence of green finance on environmental issues like carbon emission and cite a variety of factors like financial constraints, public policy, and management efficiency that may influence corporate efforts in developing green finance or foster green innovation for carbon emission reduction. All researches share the methodology of data collection and model analysis and demonstrated the point that green finance can help achieve corporate goals of sustainable development like reducing corporate carbon emission.

But the cited researches focused on different factors in mediating green finance and carbon emission. In the first 2 cited research, the research result was that fewer financial constraints helps with boosted green finance or innovation in reducing carbon risks. The latter 2 researches indicated that green finance negatively impacts carbon emission intensity, and the influence will be strengthened when green finance is combined with management shareholding, management stability, and environmental background executive power. And manager with foreign experiences also makes it efficient to make green finance. From the summary of the 4 researches above, this paper can understand the interconnected relation among the aspects above.

First, companies need green finance to alleviate carbon emission problems and they need to make green investment on the basis of financial support and technological innovation. In that way, bank or other financial institutions must show a willingness to cooperate with companies so that a variety of green project is planned. Next, besides funding support, the efficiency of company management within a team also matters. On the one hand, team needs consensus on something, after all, a team involves people with different experiences and traits which may potentially cause disagreement that will influence a group's decision-making in promoting green finance. On the other hand, the influence of executive power within a team also directs a group's decision making in green investment. Therefore, corporations need to do the following things: 1. corporations should regularly engage

themselves in CSR activities by disclosing environmental reports to fulfill environmental and social responsibilities so that they accumulate more green credits to have access to financial support utilized in green projects and technological innovation. 2. corporations should cooperate with the government to design and formulate appropriate policies based on public concerns about environmental issues. 3. management team needs to establish internal mechanism to resolve disagreement and maintain consistency in reaching the goal of sustainable development. 4. those who hold greater executive power should hold relevant environmental background or experiences so that they can lead the team's decision making in green finance with specialized knowledge.

All in all, green finance is important to alleviate carbon emission and in order to achieve the promotion of green finance for companies to reduce carbon emission risk, the fulfillment of environmental responsibility, team consistency and appropriate use of executive power are essential to reaching sustainable development for corporations.

3. How to Further Develop Green Finance

To foster the development of green finance, corporations can make it in the following ways.

3.1. Regulatory Frameworks and Public Financial Incentives

The role of the government in promoting green finance is specifically reflected in the implementation of mandatory or incentive green investment policies. For example, the government can force enterprises to reduce carbon emissions or encourage enterprises to invest in green projects by formulating environmental protection laws and policies. Public financial incentives, such as tax exemptions, subsidies, and loan concessions, can effectively align the financial decisions of enterprises with the Sustainable Development Goals (SDGs) and create an environment conducive to green investment. For example, Zhang and Chen pointed out that by coordinating public financial incentives with environmental goals, the government can further encourage enterprises to adopt sustainable practices [7].

3.2. Investments in Green Technologies

Increasing investment in clean and green technologies is one of the important measures to promote green finance. Green finance not only promotes the adoption of energy-saving technologies, thereby reducing carbon emissions but also improves the overall financial performance of enterprises. Wang et al. showed that green technology investment not only contributes to environmental protection but also improves the financial performance of enterprises by reducing their long-term operating costs [8]. Specifically, investment in renewable energy, clean production technology, and efficient energy-saving equipment can significantly reduce the carbon footprint of enterprises while improving their competitiveness and market share.

3.3. Green Bonds and Climate Finance

As a means of financing environmental protection projects, green bonds have gained widespread attention and application in recent years. Green bonds provide companies with a reliable source of funds to invest in sustainable practices and projects. Li and Wang showed that green bonds can provide the necessary funds for green projects, thereby effectively reducing the carbon risk of enterprises [8]. In addition, Chen et al. pointed out that financing a sustainable natural resource-based green economy and a climate-smart blue economy can bring significant environmental benefits and economic returns [7]. These financing methods not only help companies achieve environmental goals but also enhance their social responsibility and brand value.

3.4. Resource Efficiency and Green Purchasing

By improving resource efficiency and promoting green procurement, companies can significantly reduce their environmental impact. Local governments and companies can implement strategies that

focus on efficient resource use, such as optimizing production processes, reducing resource waste, and promoting circular economy models. These measures not only reduce operating costs but also minimize environmental footprints. For example, Zhou et al. showed that efficient resource use is particularly effective in reducing utility costs for companies and households, thereby improving quality of life and attracting skilled labor [9].

3.5. Local Production and Utilization

Encouraging local production and utilization not only helps reduce transportation-related environmental impacts but also enhances community economic security and creates wealth. Locally produced goods and services reduce carbon emissions and promote regional self-reliance. Yang and Liu pointed out that the multiplier effect of local spending amplifies these benefits, as local manufacturing and renewable energy projects create high-quality jobs, reduce the cost of living, and improve the overall quality of life in the community [10].

3.6. Performance-Based Incentives

The performance-based reward mechanism is an effective means to encourage enterprises to improve carbon emission management. By setting specific environmental goals and giving financial rewards to companies that achieve these goals, companies can be encouraged to actively take sustainable development measures. Hu and Zhang showed that this approach is very effective in promoting corporate green investment and improving carbon performance [11]. The performance incentive mechanism not only improves the environmental awareness of enterprises, but also enhances their competitiveness and brand image in the market.

4. Conclusion

This study aims to explore the green finance's study explores the role of green finance in fostering good corporate carbon emission management and which factors may be involved in influencing green finance's role in carbon emission reduction for corporations. To start with, this study introduces the global background of carbon emission. Nowadays, the global carbon emission driven by fuel combustion reaches a record high in 2023 with China, the US, and India being the main source of carbon emission. And to accelerate the economic recovery from the COVID-19 crisis, carbon emission was intensified to alleviate the slowdown in economic development. Then the study introduces the importance of green finance in carbon emission from the perspective of UN policy support and Paris Agreement's focus on increasing the space for green finance development and autonomy. Next, the study cited some cases of green finance's roles in corporate carbon emission alleviation from the perspective of financial constraints and better efficiency in company management. All of the cited cases indicate that green finance helps foster corporate carbon emission reduction. To enhance the efficiency of corporate implementation of green finance, for one thing, companies need to get enough financial support to make investment in green projects, for another, corporations also need to enhance the efficiency of management in multiple aspects including the relation between company management and management shareholder, the cohesion within the management team and the development of relevant background and knowledge. Finally, the study introduces multiple ways to further develop green finance like Regulatory frameworks and public financial Incentives, investments in green technologies, green Bonds, and climate finance. All in all, the study concludes that green finance plays an important role in corporate carbon emission reduction. And further study should specifically probe into how other factors like financial constraints and corporate management positively mediate the association between green finance and carbon emission reduction.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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