

Green Transformation Strategies of the Financial Industry under the Background of Dual Carbon

-- Hangzhou as an example

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Abstract: The green transformation of the financial sector has emerged as a crucial catalyst in advancing sustainable economic and social development, amidst the global battle against climate change and the pursuit of attaining peak carbon emissions and achieving carbon neutrality. This paper focuses on the green transition strategy of the financial industry under the dual-carbon target. This study aims to analyze the importance and obstacles associated with the green transformation of the financial sector in light of the dual-carbon target. The study will also assess the current status of the financial industry within the context of dual-carbon, examine the essential factors for the transformation of the financial sector, examine the practices and experiences of Hangzhou, and draw conclusions regarding the key factors for transforming the financial industry. Furthermore, this study employs a combination of literature review and macro-analysis to explore the future development trajectory of green finance. This study finds that the green transition strategies for the financial sector are policy guidance and supervision, innovation of green products and services, and international exchange and cooperation. The study reveals that Hangzhou has established a relatively comprehensive green financial system propelled by policy guidance, market-driven innovation, and international collaboration. The paper concludes by presenting the challenges and solutions encountered in the transition. It proposes policy recommendations to promote the financial industry's transition further and provides theoretical references and practical guidance for the sustainable development of China's financial sector.

Keywords: Green finance, Green transformation, Financial sector, Dual carbon target.

1. Introduction

Climate change and environmental issues have become pressing global challenges. At the United Nations Climate Summit in December 2020, China set ambitious targets for "Peak Carbon" and "Carbon Neutrality." By March 2021, these goals were integrated into China's ecological civilization strategy during the ninth meeting of the Central Financial and Economic Commission (CFEC). In response to the green and low-carbon development vision articulated by General Secretary Xi Jinping, various industries are adapting and transforming to meet these objectives. In September 2016, the People's Bank of China (PBOC) and seven other ministries introduced the "Guiding Opinions on the Construction of a Green Financial System." This framework aims to build a robust green financial system, enhance policies for green credits, and improve regulations on green bonds, supporting local green finance development and overall national green finance construction. Building on these national strategies, in December 2021, the Hangzhou Municipal People's Government released Hangzheng Letter [2021] No. 84, outlining the "14th Five-Year Plan for the Development of Hangzhou's Financial Sector." This plan aligns with both the national "14th Five-Year Plan for Economic and Social Development" and the Vision for the 23rd Five-Year Plan, setting out Hangzhou's financial sector goals from 2021 to 2025. As a critical part of the economic system, the financial industry's green transformation is essential for achieving carbon reduction targets. This paper explores Hangzhou's strategy for the green transformation of its financial sector, aiming to guide the industry towards

sustainable development and support a global shift towards a low-carbon and environmentally friendly economy. The financial sector has a significant role in realizing the dual-carbon goal. The financial industry can meet market demand for sustainable development financing by innovating green financial products and services, such as green loans and carbon trading products. Incorporating environmental, social, and governance factors into assessment frameworks enables the financial industry to incentivize companies to enhance their environmental protection, social responsibility, and corporate governance. This not only helps reduce corporate pollution and carbon emissions but also improves the sustainability and competitiveness of enterprises and promotes the economic and social transition to a green and low-carbon economy. Finance is the central intermediary of the economy, and resource allocation is one of its most important functions. Financial institutions can effectively channel capital flows toward green and sustainable development through credit, investment, insurance, and other financial instruments.

Advancing green finance, supporting the green transformation, and upgrading enterprises play a pivotal role in attaining China's 'dual-carbon' goals. In recent years, China's economy has witnessed continuous development and growth. The advancements, however, have brought to the forefront issues of resource depletion, environmental degradation, and overcapacity. As a driving force of economic development, the financial industry is crucial in promoting the economy's transition to green. Focusing on the transformation and upgrading of the financial innovation service industry is a key step to fostering the healthy growth of the economy. Green finance utilizes green capital to invest

in social and economic development, drive green technology and industries, and achieve an eco-friendly economic structure. The Chinese government introduced the objective of achieving carbon neutrality by 2060 in September 2020, subsequently making it the foremost priority for China's economic development.

This study seeks to explore progress path of green finance and how the financial sector can adapt its business model, investment strategy, and risk management to support the growth of a green economy. At the same time, this study provides policy recommendations and practical guidance by analyzing the green finance transformation of Hangzhou. By examining green finance transition strategies, this study aims to enhance public and enterprise awareness of green finance, motivate more enterprises and social organizations to participate in green finance activities, and support realizing the 'dual-carbon' goal. This study also promotes the innovation of green investment and financing mechanisms, enabling financial institutions to identify and evaluate green projects better and encouraging the flow of green capital.

2. Literature Review

2.1. Formation and Evolution of The Green Finance Concept

The origins of green finance can be traced back to the broader environmental movement and the recognition of sustainable development in the late 20th century. With the development of The Times, natural resources are constantly being destroyed, and governments and the United Nations gradually value and support green finance. The United Nations Framework Convention on Climate Change (UNFCCC), adopted by the United Nations in 1992, asserts that efforts to address climate change must be integrated with social and economic development to prevent any adverse effects on the latter. It is crucial to thoroughly consider the legitimate priority needs of developing countries to foster sustained economic growth and effectively combat poverty. It is also crucial to recognize the need for all countries, particularly developing countries, to access the resources necessary to achieve sustainable economic and social progress. The developing countries need to enhance their energy consumption strategically, explore energy efficiency improvements, and implement new technologies to mitigate greenhouse gas emissions effectively. This will bring economic and social benefits.

2.2. Green Financial Market Mechanism and Product Innovation

Green bonds, as the backbone of green financial instruments, have the dual attributes of "environmentally friendly" and "debt financing" and can guide social capital to participate in and support the development of green industries through market-based methods. It can facilitate the engagement of social capital in and provision of support for the advancement of green industries through market-oriented approaches, while also offering financial assistance to foster environmentally sustainable transformations [1]. argues that the cooperation model between green funds, government, and third-party capital has made positive progress and significantly promotes China's fund industry development and supports energy conservation, environmental protection, and carbon emission reduction.

Green funds specialize in investing in environmental

protection and sustainable development projects, aiming to provide investors with long-term and stable returns while supporting the development of green industries.

2.3. Key Strategies for Transforming the Financial Sector

As China's economy enters the stage of high-quality development, green finance to support the green development of the economy has also ushered in significant development opportunities. As China's green financial development started late, the construction of a green financial system cannot yet meet the requirements of high-quality economic development. In the future, it is necessary to improve the legal system for green development, build a comprehensive governance system for green development, improve the green financial system and products, and enhance the supporting services for green financial development in four aspects [2]. In the current reality of economic green transformation, an effective green transformation path is the key to cracking the economic green transformation challenge. Existing studies have concluded that green mergers and acquisitions are important for corporate green transformation [3]. The mediation mechanism test shows that transition finance can support the green innovation of double-high enterprises by addressing financing constraints, improving green management practices, and enhancing policy-driven impacts. The heterogeneity test reveals that transformational finance plays a more significant role in fostering green innovation among double-high enterprises that are state-owned, large-scale, and situated in regions with higher levels of intellectual property protection. The findings of further research indicate that the facilitative impact of transformational finance on the green innovation of double-high enterprises contributes to the promotion of their green development. According to Qin Shuyan [4], green bonds, as the backbone of green financial instruments, have the dual attributes of "environmentally friendly" and "debt financing" and can guide social capital to participate in and support the development of green industries through market-based methods, providing financial support for the promotion of green transformation. It can steer social capital toward backing the growth of the green sector using market-based approaches and offering financial aid to drive sustainable practices. It shows that strengthening the innovation of green financial products and services has a significant role to play. At the same time, formulating and improving the green financial policy system positively impacts the green transformation of the financial industry. In August 2016, the People's Bank of China, along with seven other ministries and commissions, jointly issued the "Guiding Opinions on Establishing an Environmentally Sustainable Financial System. This document provides guiding suggestions for establishing a national green financial system.

2.4. Future Trends and Prospects of Green Transformation in the Financial Sector

Improve the penetration of digital technology in the practice of green finance and transition finance, use big data, artificial intelligence and other digital technology means to solve the real pain points existing in the development of green finance and transition finance, improve the level of financial digitization and digital service capacity, enhance the risk identification ability, product innovation ability and application effectiveness, and secondly, play the advantages of digital technology in the construction of the articulation

system of green finance and transition finance. To realize information sharing and interoperability between green finance and transition finance through the establishment of a comprehensive service platform, and to promote the effective connection between the two [5].

The green financial policy has a promoting effect on the level of the regional economic low-carbon transition [6]. Through the use of an all-factor non-radial directional distance function and common frontier (Meta-frontier) non-radial Malmquist index measurement method research found that the type passed the parallel trend test and robustness test; the scale of financial development in the green financial policy impact on economic low-carbon transition. Green financial policies promote economic low-carbon transformation through technological innovation, energy saving, and industrial structure adjustment.

3. Analysis of the Current Situation of the Financial Sector in the Context of Dual-carbon

Against the backdrop of the dual-carbon target, China's financial sector is gradually transforming into a green and low-carbon model. Currently, Chinese government regulators, financial institutions, and the market are all promoting the progress of green finance to help realize the dual-carbon goal.

The Chinese government has implemented a series of policy measures at the policy level to promote the advancement of green finance. Building on this, China has released a series of relevant policy documents to guide financial institutions in participating in green finance and to promote the development of a green economy. The advancement of standardized green debt and credit, improved ESG information transparency, and enhanced green financial standards have driven the development of green finance through policies.

Regarding market response, China's financial industry has responded positively to the policy of dual-carbon targets, and the range and scope of green financial products have been expanding. Financial products such as green credit, bonds, and funds have developed rapidly in recent years and have become important tools to support green and low-carbon transformation. According to statistical data, China's green bond issuance has achieved a leading position globally by the end of 2023. Moreover, the balance of green credit has consistently expanded, encompassing diverse fields such as clean energy, energy conservation and environmental protection, as well as green transportation projects. Financial institutions are actively financing low-carbon projects through issuing green bonds, providing green loans, investing in green funds, and providing financial support for the green transformation of enterprises. Meanwhile, an increasing number of financial and investment institutions and individuals have started to adopt ESG investment principles. This shift has led to a growing emphasis on environmental and social responsibility among investment institutions, contributing to the advancement of the green financial market.

However, although policy guidance and market practice have achieved certain results, China's financial industry still faces many challenges in realizing the dual-carbon goal. First, the coverage of green financial products still needs to be further expanded, and some financial institutions cannot identify and evaluate green projects, leading to unsatisfactory results in the practice of green finance. Secondly, the problem

of non-uniform and non-transparent green financial standards still exists, and the recognition criteria for green financial products in the market have not yet been fully unified, leading to the phenomenon of "green bleaching" from time to time.

4. Key Factors in The Green Transformation of The Financial Sector

The green transformation of the financial industry is a key means of achieving sustainable economic progress and addressing shifts in change. Some factors can influence the success of transformation.

The foundation for driving the green transformation of the financial sector lies in policy support. The government policy not only indicates the direction of development of green finance but also reduces costs and risks for financial institutions involved in green finance through fiscal incentives, tax reductions, etc. The government plays the regulating role of the tax mechanism, and should further refine the specific requirements for tax incentives in the areas of water conservation skills, environmental protection, and comprehensive utilization of resources; improve the construction of the green tax system, and at present, China's water resource fee tax has been piloted for more than 20 years, and has accumulated rich experience, which is urgently needed to be implemented on a national scale [7]. The Chinese Government has also recently issued a series of official documents aimed at promoting and facilitating the advancement of green finance, such as the Guidance on Green Finance, which has clarified the roles and responsibilities of the financial sector in the green transition and set out specific measures to chart the way for the progress of green finance. These policies provide financial institutions with clear incentives and directions for implementation, thus promoting the invention and generalization of green finance products.

The role of innovation in science and technological advancements in green finance is pivotal for facilitating the green transformation of the financial industry. Enterprises and financial institutions support green and low-carbon transformation through technological innovation, help enterprises reduce their environmental impact, and improve production efficiency by funding energy companies to conduct research, development, and innovation in environmental protection technologies such as clean fuel technologies. Emerging technologies such as blockchain, big data, and artificial intelligence offer novel opportunities for the advancement of green finance. For example, big data analytics can help the financial sector assess green projects' environmental impact and potential risks more accurately. Artificial intelligence can help the financial industry predict climate risks and improve risk management capabilities. The technological advancements have played a pivotal role in bolstering the growth of green finance and facilitating the green transformation of the financial sector to a significant extent.

Market demand is also a pivotal factor in promoting the green transformation of the financial sector. The growing public awareness of environmental conservation and the escalating global climate change issues have prompted many governments and businesses to prioritize the adoption of green financial products. The market demand for green financial products has grown rapidly. This tendency encourages the financial sector to invent and launch new

products to satisfy the market demand, such as green bonds, green funds, green insurance, etc. These products strengthen enterprises' green and low-carbon transformation and meet investors' demands.

In globalization, green transformation relies on domestic policy and technical support. It needs to be aligned with international standards, participating in the competition of the global market for green transformation in the financial sector. I am sharing the best practices and innovative experience of green finance through cooperation with international financial institutions. Aligning with the international standard system related to green bonds and realizing the labeling and standardization of green bond issuance as soon as possible can accelerate the green transformation process of domestic financial institutions themselves.

5. Analysis of Green Transformation Strategies in the Financial Sector + Hangzhou Case Study

Policy guidance, financial innovation, and international cooperation are the main strategies for the green transformation of the financial sector. These strategies provide multicultural ways of transformation in a low-carbon economy. The following section analyzes the main strategy of green transformation and uses Hangzhou as an example to demonstrate the effects and experiences in practical application.

5.1. Policy Guidance and Oversight

The government and regulators have introduced various policy measures to guide financial institutions in supporting green finance, which is crucial for achieving carbon capping and neutrality goals. The central government's Guiding Opinions on Green Finance mandates that financial institutions enhance support for green industries and develop green products like green credit, bonds, and insurance. The Zhejiang Provincial Government has also implemented the Zhejiang Green Finance Development Plan to refine green finance practices and encourage continuous innovation among financial institutions. These policies provide a robust foundation for Hangzhou's financial sector transformation and actively engage financial institutions through improved policy guidance and incentives.

The policies also incentivize financial institutions to enhance their risk management models by incorporating environmental, social, and governance (ESG) factors into their frameworks for assessing risks. This has led institutions to focus more on environmental and climate change risks. For instance, Ant Financial Group has developed a strategic plan for green transformation, incorporating green principles into credit assessments and product design. Furthermore, the policies promote the establishment and promotion of environmentally friendly financial products to facilitate sustainable economic development. In response to these policies, numerous institutions based in Hangzhou have introduced green bonds, loans, and insurance schemes aimed at financing projects related to energy conservation, emission reduction, renewable energy sources, and environmental protection. The Bank of Hangzhou, for example, has emerged as a national leader in issuing green bonds, with funds allocated to various green ecological protection projects.

5.2. Innovation in Financial Products and Services

Hangzhou should expedite the accelerated integration of financial technology and green finance, while simultaneously enhancing the capacity of financial institutions to provide green financial services. The development of financial technology offers new opportunities for green financial innovation, especially in data analysis, risk assessment, product pricing, etc. Hangzhou, China, known as the birthplace of internet finance, boasts rich fintech resources and a solid foundation for developing green financial technology. For example, Ant Financial Group has created a blockchain-based green bond trading platform to enhance market liquidity and transparency of green bond information, attracting more investors. At the same time, financial institutions can use financial technology to create environmental benefit databases for green financial instruments, provide more accurate environmental benefit assessment services, and provide investors with a reliable basis for investment decisions.

5.3. Co-operation and International Experience

International exchanges and cooperation are crucial for advancing the green transformation of the financial industry. By engaging in global collaboration, financial institutions can access advanced concepts, technology, and capital, facilitating breakthroughs in green finance. As a leading city in China's green financial reform, Hangzhou has actively pursued international partnerships to drive this transformation. Hangzhou's participation in international green finance mechanisms enhances its global influence. As the host city for the G20 Summit, Hangzhou has leveraged this platform to contribute to global green finance discussions. The G20 Green Finance Study Group's Comprehensive Report, released at the summit, provides key guidance for global green finance development. Hangzhou has used this opportunity to engage with international experts and institutions, drawing on worldwide experience and offering valuable policy recommendations. Additionally, Hangzhou has partnered with international financial institutions to promote local innovation in green finance. Regional banks have closely collaborated with the International Finance Corporation (IFC) to strengthen and expand their green loan programs. This collaboration has bolstered Hangzhou's financial sector capabilities, enticed international investment, and advanced the city's financial industry's green transformation.

6. Future Trends and Challenges in The Green Transformation of The Financial Sector

6.1. Future Development Prospects and Strategic Recommendations

For China's financial sector to thrive amid the green transition, three key areas require focus: advancing green financial innovation, integrating digital technology, and fostering international cooperation. Firstly, financial institutions should broaden their range of green financial products, including green bonds, loans, insurance, and funds. This diversification will address the financing needs of various green projects. Big data, artificial intelligence, and

blockchain can enhance transparency, traceability, and efficiency in managing green financial products and projects. Moreover, promoting digital technology is crucial. Advanced technologies will streamline green finance operations, enhancing the effectiveness of green project management and boosting the overall impact of green financial products. Furthermore, international cooperation is vital. China should strengthen collaboration with global financial institutions, adopt best practices in international green finance, and work to internationalize its green finance sector. This includes creating global green financial standards, facilitating cross-border green finance activities, and attracting international investments to support projects like those in Hangzhou's green transformation.

6.2. Challenges and Strategies

The green finance market exhibits substantial potential; however, its current demand remains limited. Insufficient awareness of green financial products among small and medium-sized enterprises (SMEs) and individual investors impedes the effective promotion of this market. Green SMEs in China commonly encounter difficulties such as expensive and challenging financing. On the other hand, green credit projects for SMEs are often at the start-up stage of the industry, and commercial banks face a mismatch of benefits, costs, and risks. Despite the huge potential of the green finance market, demand remains limited. Meanwhile, for financial institutions, green finance projects are frequently characterized by high uncertainty and risk, and financial institutions are not easily able to assess and manage these risks, thus affecting their willingness to invest in green projects. To address these challenges, strategies should focus on increasing the visibility of green finance through targeted marketing and establishing robust risk management tools that provide financial institutions with a clearer assessment of potential risks.

The industry's lack of standardized technical criteria is a major barrier to green finance. Currently, inconsistent certification mechanisms and standards for carbon emission reductions and third-party assessments limit the review and evaluation of green project finance, hindering the growth of green financing. Varying methods and standards from different organizations result in inconsistent certification outcomes, complicating risk management for banks and impeding green finance's sustainable development. Additionally, inadequate data transparency and low information disclosure hinder accurate program evaluation. Limited technological innovation and a shortage of fintech professionals further restrict the development of innovative green financial products. To address these challenges, the government and industry should expedite the development of standardized certification systems, establish a unified information disclosure platform, and enhance transparency and comparability of green projects.

7. Concluding Remarks

Amidst the "dual-carbon" strategy, the financial sector's green transformation has become crucial for sustainable development and fighting climate change. The second-largest economy in the world, China, has made remarkable strides in green finance. The green transformation of the financial industry plays a pivotal role in realizing the great rejuvenation of the Chinese nation and fulfilling the Chinese dream. The promotion and advancement of the green transformation in the financial industry constitutes a crucial subject that

warrants comprehensive exploration, given its significance for both the development of the financial sector and the sustainable progress of China's economy and society.

The study found that financial institutions can promote green transformation in the following ways: The government should prioritize the development and implementation of targeted policies to effectively incentivize and facilitate the green and low-carbon transformation of the financial sector, while also strengthening policy guidance and providing appropriate incentives. At the same time, a unified green financial standard system should be established to eliminate market information asymmetry and enhance the market's new confidence in green investment. Furthermore, it is imperative for the government and financial regulators to actively foster innovation and facilitate the advancement of environmentally-friendly financial products. They should attract more green capital investment by establishing green funds and credit support programs. Meanwhile, the in-depth integration of financial technology and green finance should be accelerated to enhance financial institutions' green financial service capacity. In addition, China should strengthen cooperation with international financial institutions, study and learn from the advanced experience of global green finance, and promote the global expansion of environmentally friendly finance.

The future research direction can focus on the following aspects: Firstly, studying the specific strategies adopted by different countries and regions to promote the green transformation of the financial industry and analyzing their effects. Secondly, the potential application of financial technology in promoting green finance, especially the innovative application in carbon emission data management and green investment assessment, is discussed in depth. Finally, the far-reaching impacts of the green transformation of the financial sector on the real economy are analyzed to assess its actual contribution to the realization of the "two-carbon" goal.

Although the article has been completed, due to the author's limited ability and relatively small knowledge reserve, the relevant transition theory research is not deep enough, and there is no more in-depth research on implementing specific strategies for the future green transition of the financial industry. However, it is anticipated that an increasing number of experts and scholars will imminently embark on the exploration of green transformation within the financial sector.

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