The impact of green finance on the innovative development of rural industries in Zhejiang Province under the background of dual carbon targets

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Abstract: *Based on the responsibility to promote the construction of a community with a shared future for mankind and the inherent requirements for achieving sustainable development, a major strategic decision has been made to implement the dual carbon goals. The background of the investigation is that green finance drives innovative development of the agricultural industry, empowers farmers and rural areas to achieve common prosperity, and supports high-quality development of the rural economy. However, the development of green finance under the background of the dual carbon target strategy still faces difficulties and challenges. Our group proposes the purpose and significance of the investigation.*

Based on this, our group conducted a survey of residents in Zhejiang Province using a combination of questionnaire surveys and field interviews. We analyzed the survey results using relevant theoretical knowledge and various analytical methods. Our group conducted the survey from three dimensions: dual carbon goals, green finance, and rural industries. We used reliability analysis, validity analysis, contingency table analysis, regression analysis, SEM structural equation analysis, mediation effect analysis, and other analytical methods to organize and summarize the data, in order to better analyze the relationship between the three. In addition, our group conducted interviews with ordinary residents in urban and rural areas, local business leaders in urban and rural areas, and grassroots workers in urban and rural areas to understand their views on the implementation of the dual carbon target policy, and summarized the interview content. Aiming to deeply explore the impact of green finance on the innovative development of rural industries in Zhejiang Province under the current dual carbon target background.

After in-depth investigation and research, our group has concluded that the gap in the popularization of the dual carbon target policy in rural industry development in Zhejiang Province is gradually narrowing, and the relevant laws and regulations for the rapid development of green finance in Zhejiang Province are not yet perfect. In the context of the dual carbon target, the level of rural industry development needs to be improved. Specific investigation suggestions are proposed for the government, green finance related enterprises, and residents, aiming to promote the stable development of green finance, better implement the dual carbon target policy, and enhance the innovation level of rural industries.

Keywords: *dual carbon target; Green finance; Rural industry; Innovation-driven development*

I.   Introduction

The impact of green finance on the innovation and development of rural industries in Zhejiang Province under the background of Dual-Carbon target strategy.

The Dual-Carbon target is a major strategic decision made by China based on its responsibility to promote the building of a community with a shared future for mankind and the inherent requirement of achieving sustainable development.[2] The report of the 20th National Congress of the Communist Party of China proposed to "improve the taxation, financial, investment and pricing policies and standard systems to support green development", which highlights the importance of finance in promoting green development and helping to achieve the Dual-Carbon target. As the core of the modern economy, financial institutions play an important supporting role in the process of promoting green transformation and development.[1]

II.   Literature Review

Yu(2021)[4] pointed out that innovative green financial products and financial services should be taken as the starting point, so that green finance can be practically landed in rural areas; Xu(2022)[3] pointed out that the development of rural industries is of great significance to achieve the goal of Carbon Peak Carbon Neutrality and agricultural and rural modernization; Zhao and Kong (2023)[5] pointed out the new development ideas such as improving the policy rules of green finance driving new agricultural formats and promoting the type development and category design of agriculture-related green projects.

III. Investigation Idea Design

This investigation is divided into Dual-Carbon target, green finance, and rural industries. The Dual-Carbon target mainly include economic development transformation, policy system transformation, industrial structure transformation, and technological innovation transformation. Green finance mainly includes green loans, green bond, green bank, and green currency. Rural industries mainly include sustainable development, technological innovation, resident income, and supply-demand matching.

According to the situation of questionnaire distribution in the pre-survey, considering the problems of invalid answers, invalid questionnaires and low sampling efficiency in the sampling process, the team adopted the two-stage stratified sampling method based on the principle of random sampling, and determined the final sample size to be 612. The specific number of questionnaires allocated is shown in Table 1.

Table 1 Quantity of Questionnaire Allocation in Zhejiang Province

Ranking	Area	Population (millions of people)	Proportion	Questionnaire allocation quantity	Actual allocated quantity
--	whole province	6456.76	100.00%	612	616
1	Hangzhou	1193.6	18.49%	113.1588	114
2	Wenzhou	957.29	14.83%	90.7596	91
3	Ningbo	940.43	14.57%	89.1684	90
4	Jinhua	705.07	10.92%	66.8304	67
5	Taizhou	662.29	10.26%	62.7912	63
6	Jiaxing	540.09	8.36%	51.1632	52
7	Shaoxing	527.1	8.16%	49.9392	50
8	Huzhou	336.76	5.22%	31.9464	32
9	Lishui	250.74	3.88%	23.7456	24
10	Quzhou	227.62	3.53%	21.6036	22

IV. Data Analysis

4.1 Reliability analysis of the sample

(1) Reliability analysis of the sample

Reliability refers to the degree of consistency of results obtained when the same object is measured repeatedly using the same method. Generally speaking, the higher the Cronbach's alpha coefficient, the higher the reliability. In basic research, the reliability should be at least 0.80 to be acceptable.

Table 2 Cronbach's Alpha Table

	Cronbach's Alpha	Number of items
Dual-Carbon background	0.964	12
Green Finance	0.972	12
Rural Industries	0.969	12

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it can be seen that the Cronbach's alpha values of Dual-Carbon background, green finance, and rural industries in the questionnaire data are all greater than 0.7, which belongs to the high reliability interval, thus indicating that the reliability of the survey respondents high.

(2) Validity analysis of the sample

Validity refers to the degree of effectiveness of a measurement, which is the degree to which a measuring

tool can measure the trait being measured.The KMO test is used to check for correlation and skewed correlation between variables. The closer the KMO statistic is to 1, the stronger the correlation is between the variables. The Bartlett's test of sphericity has a significance coefficient of less than 0.05, i.e., the p-value is less than 0.05. The criterion is met when the coefficient of significance of Bartlett's test of sphericity is less than 0.05, i.e., P-value is less than 0.05.

Table 3 Kaiser-Meyer-Olkin and Bartlett Sphericity inspection Table

Kaiser-Meyer-Olkin Sampling suitability quantity		0.796
Bartlett Sphericity test	Approximate chi square	2036.725
	Freedom	3
	Significance	0.000

Through the Kaiser-Meyer-Olkin and Bartlett sphericity test in the validity analysis, the results show that the P value of Bartlett sphericity test is 0.000, which is less than 0.05, so it indicates that it meets the standard and the data is distributed spherically, and the Kaiser-Meyer-Olkin measure is 0.796, which is much larger than 0.70 and very close to 1 , thus indicating that the validity of Dual-Carbon background, green finance, and rural industries in this survey study is very good.

4.2 Exploring inter-sample correlations
    (1) Perform Person contingency table analysis on the sample
Table 4 Person Linked Tables

	Dual-Carbon target	Green Finance	Rural Industries
Dual-Carbon target	1		
Green Finance	0.884**	1	
Rural Industries	0.821**	0.915**	1

a. Dual-Carbon target and Green Finance
The high correlation coefficient between the Dual-Carbon target and green finance is 0.884, which is a very high correlation.In the new phase of "Carbon Peak Carbon Neutral",we will provide high-quality financial services for the implementation of the Dual-Carbon target by giving full play to the advantages of financial innovation, so as to penetrate Dual-Carbon into every aspect of life.
b. Dual-Carbon target and Rural Industries
The high correlation coefficient between the Dual-Carbon target and the rural industries is 0.821, which is a very high correlation.The implementation of the concept of green and Low-Carbon development,allow more rural entities to participate, lead the high-quality development of agriculture and rural areas.
c. Green Finance and Rural Industries
The high correlation coefficient between green finance and rural industries is 0.915, which is a very high correlation. Green finance promotes value-added products, enhance rural ecological quality by empowering the integrated development of rural industries.At the same time, green finance provides sufficient funds for rural economic development, establishes a development-related system, and actively promotes high-quality economic development.
    (3) Regression analysis of the sample
    The team also performed regression analysis on the data as shown in
    Table 5 and Table 6:

Table 5 Dual-Carbon target regression analysis Table

Mode	Non standardized coefficient		t	Standardization coefficient	Significance
	Bestimated value	Standard error		Beta distribute	
（constant）	1.088	0.085	12.765*		0.000*
Economic development transformation	0.084	0.043	2.562*	0.108	0.013*
Policy system transformation	0.062	0.036	1.658*	0.078	0.097*
Industrial structure transformation	0.147	0.041	3.186*	0.173	0.002*
Technological innovation transformation	0.461	0.042	10.463*	0.521	0.000*
F value	350.942				
Adjusted R-square	0.693				

By Table 5 it can be seen that economic development transformation, industrial structure transformation and technological innovation transformation have a positive impact on rural industries. Technological innovation transformation is influenced by economic development transformation, and economic development determines technological innovation. Since the reform and opening up, the economic level has been improving, technological innovation has been increasing, and the average annual growth rate of technological development transformation has gradually become higher. Technological innovation and transformation of development mode are interrelated and interact with each other, and the diversification of rural industrial business, the upgrading of the consumer market and the transformation of the production mode are the embodiment of its demand.

Table 6 Green Finance regression analysis Table

Mode	Non standardized coefficient		t	Standardization coefficient	Significance
	Bestimated value	Standard error		Beta distribute	
（Constant）	0.444	0.064	6.987*		0.000*
Green credit	0.062	0.023	1.928*	0.078	0.052*
Green bond	0.041	0.041	1.202*	0.056	0.241*
Green bank	0.372	0.037	7.986*	0.439	0.000*
Green Currency	0.415	0.029	11.342*	0.297	0.000*
F value	907.231				
Adjusted R-square	0.839				

By Table 6 it can be seen that green credit, green bank and green currency have a positive impact on rural industries. Under the influence of the Dual-Carbon target, the more perfect the system of green credit, the more favorable the conditions for rural industries; the more perfect the operation of green bank, the higher the credit of rural industries; the more integrated the green currency with economic development, the more rapid the circulation of rural industries.

4.3 Analysis of the mediating effect of inter sample significance
It is necessary to use corresponding research methods to realize the mediation effect in the specific research. The specific analysis structure is shown.

The data analysis of the relationship between the Dual-Carbon background, green finance and rural industries is shown in Table 8 and Table 9.

Table 7 Green finance under the Dual-Carbon background Regression analysis Table

	Model	Non-standardized coefficient		Standardized coefficient	t	Sig.
		B	Standard error			
1	（Constant）	0.077	0.081	0.000	0.865	0.377
	Dual-Carbon background	0.967	0.023	0.879	48.001	0.000
a．Dependent variable：Green Finance						

Table 8 Regression analysis table of Dual-Carbon background and green finance on rural industries

	Model	Non-standardized coefficient		Standardized coefficient	t	Sig.
		B	Standard error			
1	（Constant）	0.551	0.071	0.000	7.654	0.000
	Dual-Carbon background	0.852	0.019	0.908	55.256	0.000
2	（Constant）	0.549	0.072	0.000	7.231	0.000
	Dual-Carbon background	0.866	0.033	0.877	24.440	0.000
	Green Finance	0.783	0.019	0.871	35.721	0.000
a．Dependent variable：Rural Industries						

Table 8 shows that the non-standardization coefficient of Dual-Carbon background on green finance is 0.967, P<=0.05, which is significant. It shows that the development of Dual-Carbon background is conducive to promoting the improvement of green finance.The development of Dual-Carbon background is conducive to the capital market to guide resources to the allocation of green and Low-Carbon fields. Therefore, the Dual-Carbon background has a significant impact on green finance.

Table 9 shows that the standardization coefficient of available green finance on rural industries is 0.783, which is significant.It shows that the popularization of green finance is conducive to the development of rural industries. It is mainly manifested in that green finance is the financing of the green field, and it is an activity that introduces social funds into the green field through financial services such as loans, securities issuance, funds.Therefore, green finance has a significant impact on rural industries.

Table 9 shows that the standardization coefficient of the available Dual-Carbon background on rural industries is 0.852, which is significant.It shows that the development of Dual-Carbon background is conducive to the improvement of rural industries. The Dual-Carbon target effectively inhibits the impulse to develop energy-intensive industries, promotes the development of high-tech industries, and stimulates a huge amount of green financial investment.Therefore, the Dual-Carbon background has a significant impact on rural industries.It shows that the intermediate-value green finance is part of the intermediation, as shown in Chart 3.

V. Conclusion and Suggestion

5.1 Conclusion

(1) The Dual-Carbon target policy in Zhejiang Province has been popularized, and the development gap of rural industries has gradually narrowed

According to the survey results of this team, the development of rural industries in Zhejiang Province is relatively balanced. The development of green finance,the optimization of industrial structure and other favorable conditions narrow the development gap of rural industries in Zhejiang Province. Through the analysis of the research results, the team can conclude that the Dual-Carbon target, green finance and rural industries are highly correlated. The development of green finance promotes the realization of Dual-Carbon target, and the development level of rural industries is increasing with the popularization of Dual-Carbon target policies.With the development of green finance, residents' living standards have been improved, the gap in rural industrial development has been narrowed.

(2) Green finance has developed rapidly in Zhejiang Province, but relevant laws and regulations have not yet been perfected

At present, the policies related to the Dual-Carbon target have not been improved, and the development of green finance is uneven.Although the national level has issued a series of policies around the development of green finance. However, the establishment and improvement of relevant laws and regulations in orderly competition between enterprises and industries, and the integrated development of green finance and carbon finance are still relatively lagging behind. According to the survey data analysis, improving the relevant laws and regulations is more conducive to the development of green finance. In order to better implement the Dual-Carbon target policy and improve the development level of rural industries, it is necessary to regulate the development of green finance.

(3) In the context of the Dual-Carbon target, the development level of rural industries needs to be improved

The survey shows that there are too many low-end traditional industries in the rural industrial structure, the structure is unbalanced, and the per capital income level is low. Although Zhejiang Province vigorously promotes the Dual-Carbon target policy, the income gap of rural industries is also narrowing, but the collective can not represent the individual, and the development of the individual can promote the collective development to a certain extent. The imbalance and imperfection of the rural industrial structure will slow down the realization of the Dual-Carbon target to a certain extent, so the development level of rural industries still needs to be improved.

5.2 Suggestion

(1) Suggestions for government

In recent years, China has maintained strategic focus on strengthening ecological civilization construction, and achieved positive results in green and Low-Carbon development. However, at present, the relevant policies of the Dual-Carbon target are not perfect enough, and the Dual-Carbon target has not been realized. In order to better implement the Dual-Carbon target, it is necessary to establish and improve the incentive and restraint mechanism of the Dual-Carbon work, speed up the improvement of the relevant policy system and promote the development of the Dual-Carbon target in Zhejiang Province.

Under the background of the Dual-Carbon target, green finance in Zhejiang Province has gradually developed and grown. Zhejiang has a high level of economic development and a fast start in the development of green finance, and has the conditions to take the lead in the country to realize the deep integration of green finance

and economic development. Therefore, the government should improve the environment for green finance optimization and innovation, increase support for green finance through channels such as commercial credit rating and deposit insurance rate.

(2) Suggestions for enterprises related to green finance

Enterprises related to green finance should promote the innovation of green financial products and build a solid carbon market base, increase the talent pool in core technology research and development, big data application and other fields, and strengthen unified supervision of enterprises. Enterprises related to green finance should strengthen the rural industries, shorten the industrial gap, meet the needs of Zhejiang residents for a better life, promote the deep integration of green finance and economic development, and help realize the Dual-Carbon target.

Regarding the phenomenon of excessive collection of users' personal information reported by residents, enterprises related to green finance should consciously abide by relevant policies and moral bottom lines, protect users' personal privacy, and prevent users' personal information from being used by illegal elements. Improve the integrity of enterprises, establish a good corporate image, and promote the healthy development of green finance.

(3) Suggestions for residents

The high social attention to green finance provides a stable environment for the development of green finance, reduces the exploration cost of green finance development, and helps to cultivate a new service system and financing model. Let green finance no longer be a development concept, it will be more integrated into our daily life, and the well-being brought by green finance will benefit ordinary people. Therefore, in the context of the Dual-Carbon target, the residents of Zhejiang Province should adapt to the development of green finance, give full play to their own talents, achieve full employment, improve living standards, and drive industrial development.

The Dual-Carbon target aims to promote industrial transformation and upgrading and improve the quality of economic growth. Zhejiang Provincial government should actively implement the Dual-Carbon target policy, and residents should also actively respond to the Dual-Carbon target policy of Zhejiang Provincial government, further deepen the concept of green development, promote the development of new energy industries in countrysides of Zhejiang Province, and enhance residents' sense of satisfaction and gain.

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