STUDY ON GREEN DEVELOPMENT STRATEGY OF EXPORT MANUFACTURING COMPANIES IN CHINA'S YANGTZE RIVER ECONOMIC BELT

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This Independent Study has been Approved as a Partial Fulfillment of the Requirement of International Master of Business Administration in International Business Management

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ABSTRACT

As the main body of a country's national economy, manufacturing industry is the key to achieve sustainable economic development. However, the development of China's manufacturing industry is faced with many problems such as unreasonable industrial structure, lack of key core technologies, rising labor costs, strengthening resource and environmental constraints, and serious overcapacity, which seriously affect the quality of China's manufacturing industry. The objective are:1)The purpose is to promote the impact of the "dual carbon" goal on optimizing the policy structure of the export manufacturing industry in the Yangtze River Economic Zone, thereby achieving green transformation;2)The goal of managing and improving carbon emission reduction under the "dual carbon" goal will lead to green technological innovation, which will make a significant contribution to the high-quality development of export manufacturing policies in the Yangtze River Economic Zone.

This paper examine "quality-sustainable development-sustainable development of manufacturing industry" as the logical line, scientifically define the connotation of sustainable development of manufacturing industry, and combine sustainable development theory, environmental Kuznets curve theory, equator principle theory and corporate governance theory; The cognitive system of "three layers and six dimensions" for sustainable development of manufacturing industry is put forward. Secondly, the questionnaire survey and evaluation of the sustainable development of the

manufacturing industry in the Yangtze River Economic Belt from 2007 to 2019 are analyzed by spss26 through quantitative analysis method, and the results are obtained. It is clear that green technology innovation and double carbon target under the double carbon target have a significant impact on the high-quality development of export manufacturing enterprises in the Yangtze River Economic Belt. Conclusion: In the evaluation of the status quo, the quality of sustainable development of manufacturing industry in the Yangtze River Economic Belt has steadily increased, forming a pattern of "higher downstream, lower middle and upper reaches". And the hypothesis made by the two variables was verified to be valid, which solved the problem in this study and aimed to have a significant impact on the high-quality development of export manufacturing enterprises in the Yangtze River Economic Belt through green technology innovation under the "dual carbon" and "dual carbon" goals.

Keywords: yangtze river economic belt, export trade mode, export commodity structure, high-quality economic development

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Declaration

I, Tian MaoXian, hereby certify that the work embodied in this independent study entitled "Study on Green Development Strategy of Export Manufacturing Companies in China's Yangtze River Economic Belt" is result of original research and has not been submitted for a higher degree to any other university or institution.

(Tian MaoXian)
August 5, 2023

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Chapter 1 Introduction

This chapter details the background to the chosen topic, focusing on the solve the global climate problem, effectively implement the Paris Agreement, and promote green, low-carbon and high-quality economic development, China government has formulated a critical development goal of "carbon peaking, carbon neutralization" (short for "dual carbon"). The systematic and leading role of "dual carbon" development will have many impacts on national ecological protection and industrial quality improvement during the "14th Five Year Plan" or even longer. The traditional extensive production development mode has been unable to continue, and the transformation of an industrial structure must be promoted through carbon emissions and environmental protection. China is still in the middle and late stages of industrial development. In the future, China's total energy will continue to increase, and its carbon dioxide emissions will remain at a high level (Brandt & Morrow, 2016). Carbon emission is the key to national carbon peak, carbon neutralization and green development. In 2021, all walks of life in China will thoroughly implement the decision-making and deployment related to the “dual carbon” goal, and actively study the action route and implementation path of carbon peaking and carbon neutralization (Liu et al., 2006).

Therefore, based on the analysis of the characteristics of the export trade structure of the Yangtze River Economic Belt under the dual carbon background, this paper puts forward the countermeasures and suggestions to optimize the trade structure of the Yangtze River Economic Belt from the perspective of the government and enterprises. To improve understanding, conduct in-depth research, and accurately grasp the characteristics of the export trade structure of the Yangtze River Economic Belt (Berg et al., 2016). In order to meet the requirements of China's “dual carbon” goal and promote the green, low-carbon transformation and high-quality development of industrial export enterprises, we should fully understand and deeply study the problems faced by industrial export enterprises and accurately grasp the difficulties faced by export industrial enterprises. After all, the transformation and upgrading of industrial export enterprises are slow. Although many enterprises in the Yangtze River Economic Belt have completed the work of energy conservation and emission reduction, with the proposal and realization of the “dual carbon” goal, the pressure on energy conservation and emission reduction will continue to exist.

1.1 Background of the Study

China is a large manufacturing country in the world. China's manufacturing industry plays a key role in promoting social progress and stimulating the economy. In particular, there are many manufacturing industries in the Yangtze River basin, and the industrial categories are very complete. After more than 40 years of development, the Yangtze River Economic Belt has become the center of gravity and core economic belt of China's economy. With China's accession to the WTO, the export manufacturing industry of the Yangtze River Economic Belt has made remarkable achievements,

contributing more than 50% of China's GDP (Shao, 2012). However, these export manufacturing industries have long adopted the extensive development model of rapid growth, high emissions, high energy consumption and high pollution, which has caused serious ecological and environmental problems, overcapacity and unreasonable industrial structure, and has aroused great concern of the society and the government. In 2019, 11 provinces and cities in the Yangtze River Economic Belt achieved a GDP of 45.8 trillion yuan, with an average growth rate of 7.2%, 0.2 percentage points lower than the growth rate of the previous year, 1.1 percentage points higher than the growth rate of China's GDP in the same period, and the leading range of the previous year (Stock & Yogo, 2002). The per capital GDP reached 78,276 yuan, a year-on-year increase in 3.4%, nearly 7,400 yuan higher than the national average, and the leading range was further expanded.

Among the 11 provinces and cities, only Shanghai (6.0%) has lower GDP growth rate than the whole country, and Anhui, Jiangxi, Hunan, Sichuan, Guizhou and Yunnan have lower GDP per capita than the national level (Bodendorf et al., 2022). In general, the economic scale of the Yangtze River Economic Belt has achieved sustained and stable growth, but the economic growth is slowing down, which is superior to the national economic growth.

TABLE 1-1 The GDP and per capital GDP of 11 provinces and cities along the Yangtze River Economic Belt in 2019

Area	GDP(million)		GDP speed increase(%)		per capital GDP(yuan)	
	2018	2019	2018	2019	2018	2019
Shanghai	32680	38155	6.6	6.0	135000	157300
Jiangsu	92595	99632	6.7	6.1	115168	123607
Zhejiang	56197	62352	7.1	6.8	98643	107624
Anhui	30007	37114	8.0	7.5	47712	58496
Jiangxi	21985	24758	8.7	8.0	47434	53164
Hubei	39367	45828	7.8	7.5	66531	77321
Hunan	36426	39752	7.8	7.6	52950	57540
Chongqing	20363	23606	6.0	6.3	65933	75828
Sichuan	40678	46616	8.0	7.5	48883	55774
Guizhou	14806	16769	9.1	8.3	41244	46433
Yunnan	17881	23224	8.9	8.1	34545	47944
Yangtze river economic belt	402985	457806	7.7	7.2	68549	78276
Nationwide	900309	990865	6.6	6.1	64644	70892

Data source: China and provincial and municipal statistical bulletins from 2018 to 2019.

TABLE 1-2 Proportion of GDP of 11 provinces and cities in the Yangtze River Economic Belt from 2017 to 2019

Region	2017 year		2018 year		2019 year	
	GDP	Proportion of GDP (%)	GDP	Proportion of GDP (%)	GDP	Proportion of GDP (%)
Shanghai	30134	8.1	32680	8.1	38155	8.3
Jiangsu	85901	23.0	92595	23.0	99632	21.8
Zhejiang	51768	13.8	56197	13.9	62352	13.6
Anhui	27519	7.4	30007	7.4	37114	8.1
Jiangxi	20819	5.6	21985	5.5	24758	5.4
Hubei	36523	9.8	39367	9.8	45828	10.0
Hunan	34591	9.3	36426	9.0	39752	8.7
Chongqing	19500	5.2	20363	5.1	23606	5.2
Sichuan	36980	9.9	40678	10.1	46616	10.2
Guizhou	13541	3.6	14806	3.7	16769	3.7
Yunnan	16531	4.4	17881	4.4	23224	5.1
Yangtze river economic belt	373807		402985		457806	
Nationwide	827122		900309		990865	
Proportion	45.2%		44.8%		46.2%	

Data source: China and provincial and municipal statistical bulletins from 2018 to 2019.

In 2016, the Chinese government issued the Outline for the Development of the Yangtze River Economic Belt, which proposed a number of major tasks, including protecting and repairing the ecological environment of the Yangtze River, building a comprehensive three-dimensional transportation corridor, innovation driven industrial transformation. And building a new pattern of opening up in both east and west directions, with the goal of building the Yangtze River Economic Belt into a gold economic belt. The Chinese government will announce the “dual carbon” goal to the world in 2020 (Bodendorf et al., 2022).

It is very important for these export manufacturing enterprises to transform from extensive development to fine development, from high energy consumption to green, and to shoulder the mission of national energy conservation and emission reduction, so as to transform the production mode and coordinate their self-development with other enterprises in the economic belt (Ma & Liu, 2016). This paper selects the export enterprises of the Yangtze River economy as the research object. I start with the analysis of the industrial structure of export manufacturing enterprises, discuss the export trade model, analyze the existing problems, put forward countermeasures and suggestions for optimizing the structure, and propose a green, innovative, coordinated and efficient

sustainable development model from the perspective of the government and enterprises. I hope to take the Yangtze River Economic Belt as the model and try first for other regions in China, The green development practice of other industries brings demonstration effect.

1.2 Problem of the Study

In 2020, China solemnly promises to the world to strive to achieve carbon peak by 2030 and carbon neutrality by 2060 (Tang et al, 2021). China's economy has changed from high-speed growth to high-quality, and the development of export manufacturing enterprises in the Yangtze River Economic Belt is facing many challenges. It is necessary for every export manufacturing enterprise to realize not only the transformation and upgrading of enterprises, but also high-quality green development. For a long time, the export enterprises in the Yangtze River Economic Belt have developed rapidly with the extensive growth model of quantity and speed, creating more than 40% of China's GDP (Jameel et al, 2017). However, the following is overcapacity, and the ecological environment problem has become increasingly prominent, which has followed the old path of "development first and governance later", making the contradiction between ecological environment and governance and protection, the contradiction between unreasonable industrial structure and overcapacity, the contradiction between the domestic market and the international market (Goos et al, 2014). To solve these contradictions, we must change the industrial structure, reduce costs and increase efficiency, increase investment in scientific and technological innovation, so as to promote the innovative and green sustainable development of export manufacturing enterprises.

1.3 Research Questions

To solve these contradictions, we must change the industrial structure, reduce costs and increase efficiency, increase investment in scientific and technological innovation, and Hopkins et al. (2008) increase investment in energy conservation and environmental protection, so as to promote the innovative and green sustainable development of export manufacturing enterprises.

Based on this fact, this study therefore aims to examine two questions:

1.What is the goal of “dual carbon” have a significant impact on the high-quality development of export manufacturing enterprises in the Yangtze River Economic Belt?

2.What is green technology innovation under the "double-carbon" goal have a significant impact on the high-quality development of export manufacturing enterprises in the Yangtze River Economic Belt?

1.4 Objectives of the Study

The impact of the Central Economic Work Conference held from December 8-10, 2021, and the "dual carbon" goal remains one of the important themes of the conference. The proposed goals and visions of carbon peak and carbon neutrality mean that China will more firmly implement the concept of green and low-carbon development and

promote the green transformation and upgrading of the industry. Claessen and Laeen (2003) led the direction of technological change in the global economy, achieving green development and low-carbon recovery, and promoting global cooperative action to address climate change. The "dual carbon" development strategy will deeply promote the transformation and upgrading of China's economy, promote the coordinated development of regional industries, adjust the energy structure, and enhance technological innovation. Burgess and Paguio (2016) During the "14th Five Year Plan" period, China's economy accelerated its transformation to green development, and explored the path of high-quality industrial development under the "dual carbon" strategy. This article selects the Yangtze River Economic Belt as the research object, conducts a comprehensive analysis of its export trade structure under the "dual carbon" goal, and proposes countermeasures and suggestions based on the current situation, providing a reference for the optimization and upgrading of the export trade structure of the Yangtze River Economic Belt and other regions in China.

The objective are:

1.The purpose is to promote the impact of the "dual carbon" goal on optimizing the policy structure of the export manufacturing industry in the Yangtze River Economic Zone, thereby achieving green transformation.

2.The goal of managing and improving carbon emission reduction under the "dual carbon" goal will lead to green technological innovation, which will make a significant contribution to the high-quality development of export manufacturing policies in the Yangtze River Economic Zone.

1.5 Significant of the Study

Based on the above background, this paper combines the results of academic research to draw practical conclusions (Frey & Osborne, 2013). Therefore, this paper will elaborate on the significance of this research from both theoretical and practical aspects, and this paper, the author, based on a sufficient literature review, will focus on the logical relationship between various variables, which has practical and theoretical significance.

1.5.1 Theoretical significance

Presently, relevant theories and methods on the green, low-carbon and high-quality development at home and abroad have become the focus of domestic and foreign scholars. First, promote technological innovation with low-carbon and clean development of production enterprises; Hanson et al. (2005) conducted empirical research from the perspective of energy efficiency, industrial competitiveness and technological innovation, and believed that the innovative combination of the two would bring strong impetus to the improvement of China's manufacturing value chain. Li (2013) made an empirical analysis of green technology innovation and high-quality development using inter-regional panel data. The results show that green technology innovation is the main support for regional agglomeration and extension. Second, energy conservation and emission reduction can effectively improve the energy

efficiency of production enterprises and enhance their competitiveness. Xu (2019) proposed that the core of promoting China's high-quality development is the development of technology from the perspective of the interaction between technological innovation and technological innovation. Yi and Cai (2019) think that impact of industrial structure adjustment and technological breakthrough development in China is studied using the industrial structure upgrading model. Ahmed and Al-Kak (2019) pointed out that reducing energy consumption and carbon dioxide emissions through technological research and development is conducive to the environmental transformation of the manufacturing industry. And Han (2022) proposed "energy conservation and emission reduction" "Energy conservation and emission reduction, leading green, leading technology, improving economic efficiency and realizing a virtuous circle of industrial and social benefits; It is also to explore the corresponding improvement measures and criteria, which will help to enrich the management theories and enrich the research ideas.

1.5.2 Practical significance

At present, China is in the historical intersection period of achieving the two centenary goals. The “dual carbon” goal will have a profound impact on China's economic transformation and upgrading, coordinated development of regional industries, adjustment of energy structure and improvement of technological innovation. As China's economy accelerated its transformation to green development during the "Fourteenth Five Year Plan" period, under the background of promoting high-quality development of manufacturing industry, accelerating the realization of green and low-carbon development, and exploring the high-quality development path of China's manufacturing industry under the "dual carbon" goal, it is not only conducive to promoting the transformation of manufacturing industry to a low-carbon model, improving the core competitiveness of the industry, and promoting the vigorous development of the real economy, Fernandes and Tang (2012) think that help China's ecological civilization construction and green and sustainable development of resources and environment ecology, and promote the green and high-quality development of economy and society. At present, under the strategic guidance of the "dual carbon" goal, the pace of exploring the high-quality development path of China's manufacturing industry is accelerating (Hu & Du, 2020). However, how to achieve carbon reduction and emission reduction while achieving high-quality development is an important challenge facing the manufacturing industry. Therefore, based on the theories and methods related to carbon emissions and carbon dioxide emissions, this paper constructs a model to investigate the dynamic changes of carbon emission intensity of China's manufacturing industry and its impact on carbon dioxide emissions and energy consumption structure. This paper uses panel data from 2005 to 2020 to estimate and analyze the CO_2 emissions of manufacturing industry, and uses quantitative analysis to analyze the spatial heterogeneity of CO_2 emissions of manufacturing industry in China, to discuss the efficiency of low-carbon transformation in different industries and regions and their differences.

1.6 Limitation of the Study

This study has the following limitations:

First, due to time constraints, the impact of the COVID-19 and the limitations of the researchers themselves, I failed to conduct a comprehensive and detailed interview survey on the survey objects during the data collection period, and the data model establishment method and recovery method are mainly online.

Second, this study only selected the main business districts in the cities near the Yangtze River in the process of data model establishment distribution, and the results may be biased. In particular, the groups and occupations that are not good at using the network may be ignored as farmers and students (Tao et al., 2014). As the main business districts are located in the city center and the consumption level is high, the above two groups have a small probability of appearing in the main business districts. At the same time, whether the survey results can be applied to different occupations, different industries and different regions also needs to be further explored.

Chapter 2 Literature Review

2.1 Introduction

Accounting is a product of economic development, the review of relevant literature shows that the existing research on high-quality development of the manufacturing industry mainly focuses on green, low-carbon, energy efficiency and other aspects. Still, constructing an evaluation index system for high-quality development of the manufacturing industry is oriented to the "dual carbon" goal. The internal mechanism and empirical research of green technology innovation driving high-quality growth of China's manufacturing industry under the "dual carbon" goal are relatively rare (Kromann et al., 2019). Based on the review of existing research, this paper will briefly summarize and comment on the hot issues of current research on the high-quality development of the manufacturing industry. The manufacturing industry is the foundation of national economic construction. With the continuous development of China's social economy, China's industrial structure has undergone tremendous changes (Jin & Hu, 2017). However, in the rapid industrialization stage, the characteristics of high input, high consumption and low efficiency seriously restrict the sustainable and healthy development of China's manufacturing industry. Therefore, under the background of supply-side structural reform, how to realize the transformation and upgrading of China's manufacturing sector has become an urgent problem to be solved in the new era. Research was conducted through CNKI, Google Scholar, researchgate and other resource sites.

2.2 Literature Reviews

2.2.1 Yangtze river economic belt review

As the main body of the national economy, the manufacturing industry is the the industrial system of the Yangtze River Economic Belt (Thabit & Jasim, 2019). The Outline of the Yangtze River Economic Belt Development Plan issued in 2016 proposed that the Yangtze River Economic Belt should cultivate world-class manufacturing clusters with international advanced level in the fields of electronic information, high-end equipment, automobiles, household appliances, textiles and clothing. However, at present, the manufacturing industry in the Yangtze River Economic Belt is characterized by a heavy and chemical structure (Chen & Shen, 2021), a serious homogenization of industrial layout in some regions along the Yangtze River (Bimonte, 2002), and an unclear system orientation (Andreoni & Levinson, 2001), resulting in a large dependence on resources, a low utilization rate, and a large number of pollutants, It is beyond the bearing capacity of resources and environment, which severely restricts its further development. Under the background of the deep implementation of the "Made in China 2025" strategy, taking the road of "innovation, ten green" and integrated development is an important breakthrough for the manufacturing industry in the Yangtze River Economic Belt to solve the current dilemma, and also an inevitable choice to liberate and develop the productive forces. It is of great practical significance to timely study and judge the green innovation

development level of manufacturing industry to control, guide and promote the green innovation transformation of manufacturing industry in the Yangtze River Economic Belt.

2.2.2 High-quality economic development review

Current research on green, low-carbon and high-quality development is focused on the following areas. One, low-carbon and clean development of the manufacturing industry promotes green technological innovation. Tang (2012) argues that low-carbon transformation will reduce resource and energy consumption, reduce carbon emissions, guide the development of green innovation in manufacturing, promote technological progress and economic efficiency, and achieve positive spillover of industrial and social benefits; Chan and Sin (2009) point out that the key to achieving high-quality development in manufacturing lies in low-carbon through a study on the coupling and interaction between the speed of industrial innovation and innovation effects technology innovation. Daske and Gebhardt (2006) conducted an empirical study on the spatial Durbin model of green technological innovation and high-quality development using inter-provincial panel data in China and found that green technological innovation has become an important support for economic low-carbon transformation. The study found that green technology innovation has become an important support for low-carbon economic transformation and high-quality development, and has shown significant local aggregation effect and spillover effect in inter-provincial space. Secondly, green and low carbon promotes the improvement of energy efficiency and industrial competitiveness in manufacturing industries.

2.2.3 Export trade mode review

Brandt and Morrow (2016) argues that the research and development of technologies to reduce energy consumption intensity and carbon emission intensity can help the green transformation of the manufacturing industry; Rekarti et al. (2019) analyze from the perspectives of energy use efficiency, industrial competitiveness and green technological innovation and find that the innovative combination of green transformation of the manufacturing industry and low-carbon economy will provide a strong impetus for the climbing of China's manufacturing value chain. In addition, Tisdell (2001) explored the mutual promotion role between industrial green innovation and manufacturing structure upgrading from different perspectives; Zeng et al. (2021) found that innovation-driven and green development had a significant role in promoting the transformation of resource-based cities, and the contribution of green technological innovation was particularly prominent in the improvement of energy use efficiency.

Based on the new development pattern, green and low-carbon has become the future development direction of the manufacturing industry. Based on the two objectives of “dual carbon” and double cycle, Li (2022) proposed that in order to realize the green and low-carbon transformation of the manufacturing industry, it is necessary to balance economic, ecological and environmental and social benefits, optimize the industry structure and continuously carry out green technological innovation in order to promote the double cycle and enhance the international competitiveness of the

industry; Dai et al. (2020) proposed that by constructing extended panel econometric estimation models, Movid (2018) empirically analyzed the role of industrial structure, energy consumption intensity, etc. and carbon emissions, and found that promoting energy conservation and emission reduction and green low-carbon transformation in manufacturing industries can help improve the quality of regional economic development and industrial competitiveness. In addition, Huang et al. (2012) used carbon accounting methods and models to measure the green development level of China's manufacturing industry, and found that the energy consumption intensity of China's manufacturing industry is decreasing year by year, but it still faces greater pressure in terms of carbon emissions, and the green and low-carbon transformation still needs to be continuously promoted.

2.2.4 Export commodity structure

Rezaee and Wang (2018) measured and decomposed the industrial structure of the manufacturing industry and found that the industrial structure of China's manufacturing industry has strong characteristics of "structural convergence" and shows obvious "structural convergence" effect. Li et al. (2021) used 2007-2020 as the time series data and found that China's The green and low-carbon transformation effect of manufacturing industry is significant, but there are large differences between regions; Liu et al. (2006) found that there is a significant spatial spillover effect of green and low-carbon transformation of manufacturing industry structure in China after using the model to analyze the green and low-carbon transformation of inter-provincial panel data in China; In addition, Zhang and Zhang (2022) combined the results of data analysis to point out that China should give full play to its comparative advantages and optimize its industrial layout; Wu (2021)found that the manufacturing industry should pay attention to the ecological benefits of carbon emissions. Chen and Xu (2021) explored the path of high-quality development and realization of manufacturing industry based on the new development concept and the double-cycle strategy. Finally, the study on the coupling relationship between high-quality development and green low-carbon found that the coupling and interaction mechanism between the two mainly exists in three stages: interdependence, mutual promotion and synergistic optimisation. Based on this conclusion, it is proposed to further promote the synergy and interaction between green and low-carbon transformation and high-quality development. Fourthly, the connotation of high-quality development of manufacturing industry and its path are explored. Chen and Shen (2021) outline the connotation characteristics of high-quality development of manufacturing industry in terms of develop concept, quality and efficiency, power change, clean and efficient, etc. For the evaluation of high-quality development of manufacturing industry, Umoren and Asogwa (2013) point out that high-quality development can be evaluated in five dimensions: economic growth rate, scientific and technological innovation capability, human resources level, financial system efficiency and market resource allocation; Zhang et al. (2018) proposed that the ability of China's equipment manufacturing industry development must be improved in terms of innovation drive, factor efficiency and green manufacturing; Li et al. (2021) found that China's manufacturing industry development still faces problems such as

weak competitiveness in green development and relatively lagging quality brand construction, and proposed that the key to promoting high-quality development of manufacturing industry lies in implementing green manufacturing and intelligent manufacturing; Hu and Du (2020) explored the path of high-quality development of manufacturing industry from multiple dimensions, such as scientific and technological innovation and institutional innovation.

Fourthly, the high-quality development of manufacturing industry is studied based on different perspectives. Frey and Osborne (2013) analyzed the connotation of high-quality development of manufacturing industry from the perspective of supply-side structural reform based on two dimensions of industrial structure and trade opening; Drobyazko et al. (2019) used a spatial econometric model to analyze the manufacturing industry agglomeration degree of 32 provinces and cities in China from 2003 to 2020 and explored the differences of industry agglomeration degree among different regions ; Tuffour et al. (2022) empirically analyzed the impact of factors such as technological progress and openness to the outside world on the quality of regional economic development by constructing a spatial Durbin model; Dai et al. (2020) used a DEA model to estimate the technical efficiency of China's manufacturing industry from 2010 to 2020 and found that the low proportion and scale of R&D expenditure was the main constraint of technical efficiency improvement at this stage, and the competitiveness within the industry should be improved by reducing the proportion of R&D expenditure of enterprises.

2.3 Theory of Reviews

2.3.1 Theories of sustainable development

This section uses this theory primarily to be used for Theories of sustainable development, innovation is a new combination of production factors and production conditions, the purpose of which is to obtain potential profits and achieve economic development. Different from traditional technological innovation that improves enterprise productivity and drives economic growth, the essence of GTI is to reduce environmental pollution and improve resource utilization efficiency, thus gaining competitive advantages and ultimately promoting green sustainable development. The concept of sustainable development originally originated in China in the 1990s and was proposed by the Chinese Academy of Sciences. The concept clearly states that China must achieve zero growth in population, energy consumption and environmental pollution in order to achieve sustainable development, and has been widely recognised by scholar. Through the collation of existing research results, the idea of sustainable development is that sustainable development is an important element in the integration of society, ecology and economy. The basic idea is to promote sustainable development of society with a scientific concept of development as its guide. Green financing, on the other hand, is a perfect integration of the concept of sustainable development (Graetz & Michaels, 2018). Firstly, green financing requires a shift towards green production methods. It can control the flow of funds to environmentally friendly industries through credit financing, reduce the financing needs of high-consumption and high-pollution industries, and prompt the more polluting industries to optimise their product structures,

thereby promoting the development of a green economy. Secondly, from a social point of view, to realise the rational use of natural resources, the principle of conservation first and natural restoration first must be adopted to promote the harmonious development of ecology and economy. Secondly, from the economic perspective of sustainable development, a perspective that is in line with the concept of "green finance" is proposed. Overall economic development is not only about promoting current economic development, but also about taking responsibility for future generations and laying a solid foundation for future generations. However, sustainable development is more concerned with using resources in a way that maximises the health of the economy and sustainable ecology without depleting them.

Sustainable development implies sustainability in all aspects, most notably in economic and financial terms (Zhu, 2007). The emergence of green finance can achieve sustainable financial development, green finance can reasonably allocate financial resources, improve the efficiency of resource allocation, so as to achieve the long-term effective operation of finance. The significance of green finance is to maintain the sustainability of the environment and the economy, and to maintain the synergistic development of both, which is in line with the theory of green sustainability.

2.3.2 Environmental Kuznets Curve Theory

Grossman and Krueger (2019) argue that the environmental pollution level affects the local economy's status. The environmental Kuznets curve shows a significant correlation between income levels and the pollution of the environment in which one lives and works (Amiti & Weinstein, 2011). It suggests that as working hours increase, the development of social life skills is also related to per capita wages and is characterized by an inverse "U" shaped socio-economic pattern, with an increase followed by a decrease.

As a result of our rapid social and economic development, on the one hand, our economy is showing an increasingly green development. Therefore the state will increase its investment in the environment to improve the quality of our environment. People are seeking more material needs than the benefits of investment in technology. However, an excessive increase in material needs can exacerbate the damage to the ecological environment. As the country developed and people's basic material needs were met, the government and people began to make a solid effort to protect the environment, value a steadily growing green economy, and protect it.

2.3.3 The Equatorial Principle Theory

The Equator Principles date back to 2002 and were proposed by the then-World Bank. Theoretically, other investment organizations must comprehensively evaluate their own environmental and social risks when carrying out their regular operations so that they can advance environmental protection through the securities industry and promote economic and social development and environmental governance in different ways (Antràs & Chor, 2013). At its core, equatorialism is a national financial system based on an autonomous, co-developed. When implementing a new international financial scheme, the creative proposals of the Equator Principles should follow the

most basic environmental and social development guidelines. The continuous monitoring and early warning mechanisms implemented for the construction and operation of the project and the regular publication of the actual functioning of the central banks (Bems et al., 2011). At present, China is in an essential period of economic development and upgrading, and must proactively include enterprises in building a better China and promoting the harmonious development of the economy and environmental protection. Some commercial banks have also launched green credit and bonds to promote China's development.

2.3.4 Corporate Governance Theory

Corporate Governance (CG) theory believes that the primary objective of corporate management is to pursue the maximization of shareholders' interests and the maximum realization of shareholder value (Antràs et al., 2009). Through the decisions of the shareholders' meeting and the board of directors, the company translates its strategic planning into the interests of the shareholders, i.e. the realization of shareholder value (Berman & Héricourt, 2010). According to the basic theory of corporate governance, for a company to maximize shareholder value, it must enable all shareholders to share in the results of the company's operations. The theory of corporate governance is the inevitable result of the development of the theory and system of the company, and it has paramount guiding significance for the management of the company.

In this theory, the statute of Bonus, the Council of States and the Manager are the main factors influencing the company's business decisions and are the key to maximizing shareholder value (Antràs & Foley, 2015). The Statement of Bonus, the company's highest authority consisting of all shareholders, is the body that formally contracts with and manages the company and derives its power from the General Meeting of Shareholders. The Board of Directors (the council of States), on the other hand, is a corporate decision-making body that does not formally have all the powers of the General Meeting and the Board of Directors but is considered to play an essential role in influencing corporate decisions because of its ability to provide shareholders with a variety of information and to provide information providers.

2.4 Research Relevant

Based on this study involving independent and dependent variables, as well as a review of relevant literature and theory, it is clear that the "double-carbon" goal is not only China's forward-looking and strategic deployment to address global climate change, but also a long-term strategic consideration of the transformation of China's economic and social development in the coming decades based on the current economic situation (Bricongne et al., 2012).

First arising in the 1980s, the Yangtze River Economic Belt was transformed from the then dense industrial zone of the Yangtze River. As a core region covering three regions in the East and West with 11 provinces and cities, the Yangtze River Economic Belt contributes more than 40% of the country's GDP. The economic belt has the

highest share of industrial manufacturing in the Central Delta, averaging 96. 74% from 2012 to 2016. The middle reaches of the Yangtze River and Chengdu Chongqing accounted for 93.86% and 91.70% of total exports respectively (Antràs & Chor, 2013). Overall, the dominance of tangible goods exported from the Yangtze River Economic Zone is industrial manufactured goods. A relatively small proportion of primary products.

In terms of the types of products exported, the largest share of exports from the Yangtze River Delta region were electromagnetically products, garments and clothing accessories, and textile yarns, fabrics and products. from 2012 to 2016, the share of electromagnetically products slowly increased (Ajmal, 2017). The level of financial development in the middle reaches of the Yangtze River Economic Belt is low. The reason is that geographical factors account for a large proportion. Because the provinces and cities in the middle reaches of the Yangtze River Economic Belt are located in the central and western regions of China, the level of economic development is low, the recognition of finance is low, and the impact of the late start of regional finance on economic development is low. This has resulted in insufficient protection of the Yangtze River basin and serious damage to the ecosystem. This has led to a low level of financial development. The export value of electromagnetically products from the Yangtze River Delta region was US$2,326,175,468,600, accounting for 41.61% of the total in 2016, higher than that in 2012 of 40.80%. It can be seen that the export of products in the Yangtze River Delta region is dominated by industrial products and electromagnetically products. Machinery and transport equipment in the middle reaches of the Yangtze River grew rapidly, from just 28.21% in 2012 to 41.81% in five years (Chor & Manova, 2012). It can be seen that the processing, production and research and development industries for machinery and transport equipment in the middle reaches of the Yangtze River have gradually improved. In terms of industrial products, the Chengdu-Chongqing region also accounts for more than half of the country's total.

In line with the Yangtze River Delta region and the middle reaches of the Yangtze River, machinery and transport equipment in the Chengdu-Chongqing region increased from 33.81% in 2012 to 42.75% in 2016, the largest growth rate of the three regions (Claessens & Laeven, 2003). This shows that the Middle Yangtze River region and the Chengdu-Chongqing region have a strong growth capacity. The current situation is that the middle reaches of the Yangtze River follow the pace of export development of the Yangtze River Delta, while the Chengdu-Chongqing region follows the pace of the middle reaches of the Yangtze River, forming an export trade commodity model in which the eastern part drives the central and central regions to join hands with the western part.

Driven by economic and social development and location advantages, the Yangtze River Economic Belt has developed from a "self-sufficient" region in the past to a strategic "regional economic" hub for the whole country. At the 19th National Congress, the Yangtze River Economic Belt has become even more prominent economically and politically, which suggests that we need to increase investment and investment in the Yangtze River Economic Belt, not only to increase the rate of economic growth, but also to promote the coordinated development of the economy and environmental

protection. This is a conclusion reached only after a long period of verification and validation, and is both a grand blueprint for the development of the Yangtze River region and a model for the country's rapid economic development.

The general trade export volume of the Yangtze River Delta region is far greater than that of the middle reaches of the Yangtze River, while the general trade export volume of Chengdu Chongqing region is the smallest. In 2016, the export volume of the Yangtze River Delta region under the general trade mode reached USD 444,974,852,000 dollars, but the middle reaches of the Yangtze River region were only US 75,085,445,600 dollars, even less in Chengdu Chongqing region. From the overall change trend, the three major plates of the Yangtze River Economic Belt are all slowly rising and then slowly falling (Dai et al., 2020).

The export volume of processing trade in the Yangtze River Delta region is far greater than that in Chengdu Chongqing region and the middle reaches of the Yangtze River. For example, Jameel et al. (2017) export volume of processing trade in the Yangtze River Delta region reached USD 237,864,867,200, that in Chengdu Chongqing region was USD 39,187,702,500, and that in the middle reaches of the Yangtze River was only USD 23,622,431,100.

From 2012 to 2016, the average annual decline rate of general trade volume in the Yangtze River Delta region was 3.95%, the average annual growth rate of processing trade exports in the middle reaches of the Yangtze River region was 4.68%, while the growth rate in Chengdu Chongqing region was relatively slow, only 1.33%. From the perspective of the average annual growth rate of processing trade, the speed of the middle reaches of the Yangtze River is better than that of the Chengdu Chongqing region, and the volume of reprocessing trade in the Yangtze River Delta is declining year by year (Ding et al., 2013). It can be seen that the processing trade in the Yangtze River Delta is gradually shifting to the middle reaches of the Yangtze River.

In general, the export situation of the Yangtze River Economic Belt region is generally stable, but affected by the uncertainty of international trade, the export fluctuation of each province and city is also large.The Yangtze River Economic Belt spans three major plates in the east, west and east of China. As a region with superior natural resources and economic and social conditions, how to achieve high-quality development under the premise of excellent protection is an essential direction for the coordinated and balanced development index of the Yangtze River Economic Belt to be further deepened (Wang et al., 2022).

TABLE2-1 Investment, consumption and export of 11 provinces and cities in the Yangtze River Economic Belt in 2019

Region	Items					
	Absolute value(100 million yuan)			Growth rate (%)		
	Investment	Consumption	Export	Investment	Consumption	Export
Shanghai	8012	13497	13721	5.1	6.5	0.4
Jiangsu	58767	35291	27209	5.1	6.2	2.1

Zhejiang	36703	27176	23070	10.1	8.7	9.0
Anhui	35632	13378	2787	9.2	10.6	11.6
Jiangxi	26794	8422	2497	9.2	11.3	12.3
Hubei	39129	20244	2485	10.6	10.3	10.3
Hunan	37941	17240	3076	10.1	10.2	51.9
Chongqing	19725	9533	3713	5.7	8.7	9.4
Sichuan	30928	20144	3892	10.2	10.4	16.8
Guizhou	17881	4174	327	1.0	5.1	-3.1
Yunnan	22929	7539	1036	8.5	10.4	17.3
Yangtze river economic belt	334441	176636	83817	7.7	8.9	12.5
Nationwide	560874	411649	172342	5.1	8.0	5.0
Proportion	59.6%	42.9%	48.6%	High 2.6%	High 0.9%	High 7.5%

Data source: statistical bulletin of China and Provincial and Municipal 2019

At present, the rapid economic development of the Yangtze River Economic Belt is in the primary and critical phase of the transition period. The Yangtze River Economic Zone is still experiencing unreasonable and uneven development between economic development and environmental protection, ecological resources have received serious damage, and the issue of economic development and environmental management is becoming increasingly urgent. Therefore, it is of great significance to analyse the characteristics and internal linkages of green finance in the Yangtze River Economic Zone to the high quality economic development practices in order to guide the high quality economic development.

To sum up, the exports of general trade and processing methods of the Yangtze River Delta are much larger than those in the middle reaches of the Yangtze River and Chengdu Chongqing region. From 2012 to 2016, the general trade in the Yangtze River Delta showed a trend of slow rise first and then slow decline, and the processing trade has been declining, while the processing trade in the middle reaches of the Yangtze River and Chengdu Chongqing region have been increasing year by year as a whole (Haug et al., 2011). It can be seen that the trade structure of the Yangtze River Delta is gradually optimized, The processing trade in the middle reaches of the Yangtze River and Chengdu Chongqing began to rise.

2.5 Research Framework

The ultimate aim of economic development is to comprehensively improve the overall standard of the economy and the overall standard of living of the people, and

the fruits of development are reflected in the material life of the people. In the era of big data, green financing is a new type of financial system that combines traditional financing methods with sustainable development. For China's economic turnaround to come to a successful conclusion, it is imperative that fiscal development is as green as possible at this stage (Feenstra & Hanson, 2005). Clarifying the mechanism of the role of green finance in high-quality economic development is of great significance in promoting the green transformation of the economy and high-quality economic development. Firstly, the research results on export manufacturing policies in the Yangtze River Economic Zone under the “dual carbon” target are reviewed at home and abroad, and the current problems and issues in China are summarized". The main purpose of this article:

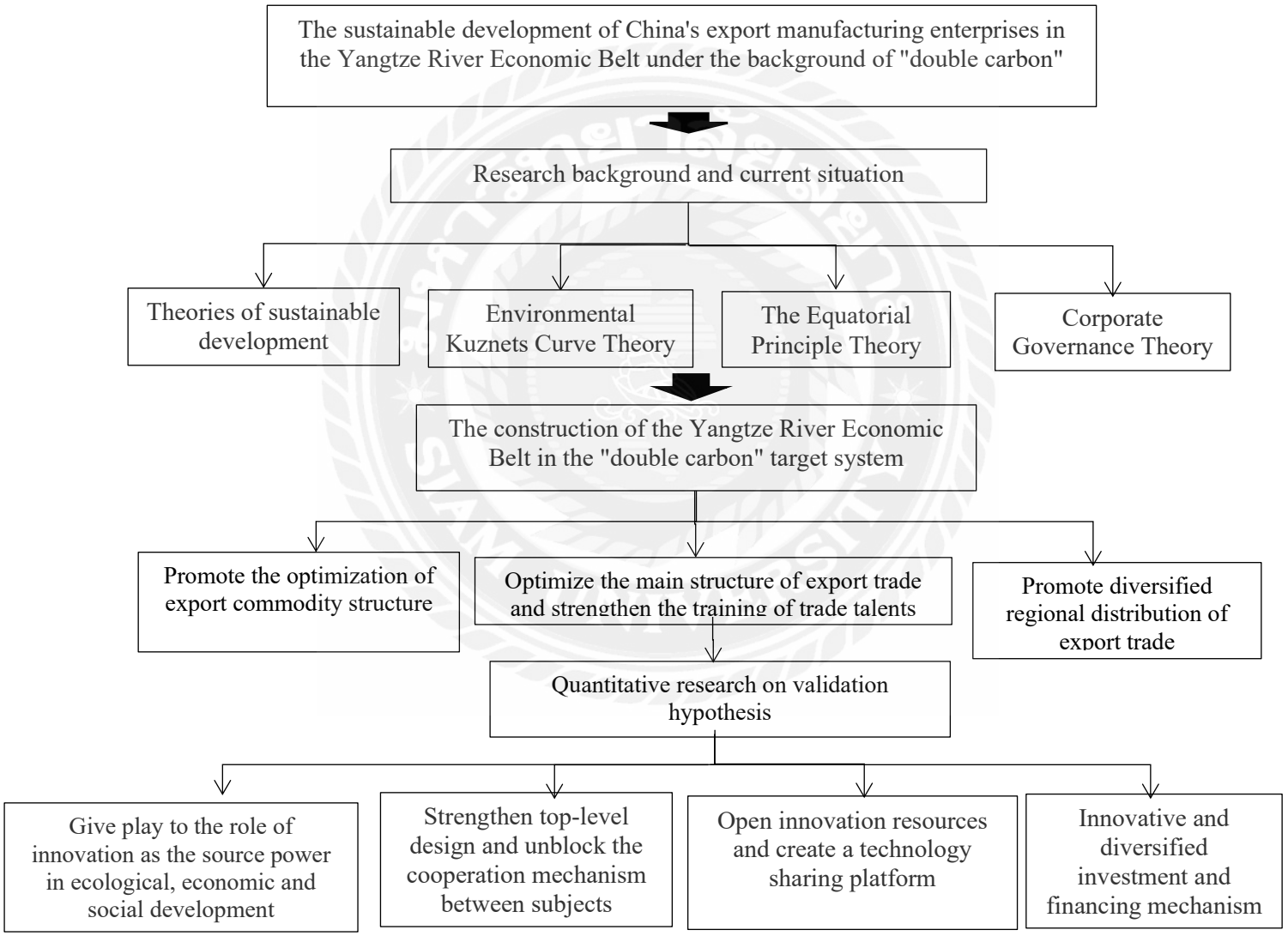

FIGURE 2-1 Technical circuit diagram

And from the perspective of the development of export manufacturing enterprises in the Yangtze River Economic Belt (independent variable), the effects of two variables are analyzed: 1) green innovation technology under the “dual carbon” target; 2) “dual carbon” target;) to verify whether the high-quality development of export

manufacturing enterprises in the Yangtze River Economic Belt (dependent variable).

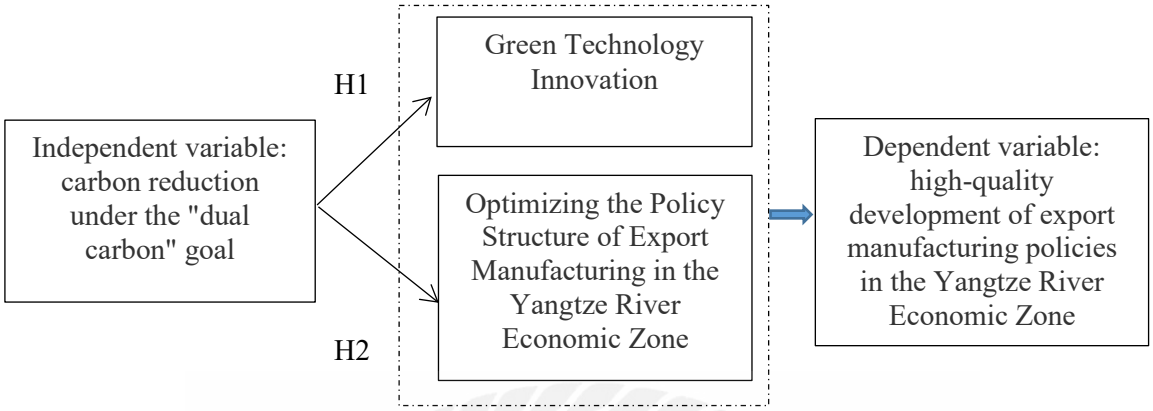

FIGURE 2-2 Conceptual Framework

2.6 Terms and Definition Used in This Study

There are a number of definitions that need to be clarified in this study.

High-quality economic development: With the major transformation of China's economic system, there is a proliferation of literature on high quality development, but their main research objects are mostly about the connotation of high quality development, the multidimensional measurement of high quality development and how to achieve high quality economic comprehensiveness. Firstly, from the perspective of the benefits of economic and social development, economic development is caused by an overall increase in output efficiency, and this process is focused on a sustained rise in labour productivity, asset allocation rates and total factor productivity (Feenstra et al., 2011). The efficiency of corporate development will also contribute to the upgrading of industries and the increased competitiveness of companies. Secondly, China's high-quality development is profiled from both micro and macro perspectives. From a macro perspective, high-quality development refers to the high-quality development of the overall economic development. In this context, the manufacturers have not only undergone rapid restructuring but also have a high level of industry concentration. From a macro point of view. The improvement in the output of companies and the quality of life of the people is high-quality economic development. High-quality development is closely related to people's daily life, especially in the course of the sharing economy, which improves the quality of living and the overall quality of the population. Therefore, for China's economy to achieve high-quality development, it must be centred on ecological quality, with harmony between the economy, society and the natural environment, with "green economy" as the main line, with "innovation " as the guide to improve economic development in harmony with the economy, society and the natural environment.

The Yangtze River Economic Belt: The Yangtze River Economic Belt has been formed since the 1980s. It is a central zone shifting from the Yangtze River region to

the east, west, west and 11 provinces, and the Yangtze River Economic Belt contributes more than 40% to domestic GDP (Graetz & Michaels, 2018). The Yangtze River Economic Belt has evolved from being a "self-reliant" region to a strategic centre of gravity for the national economy, thanks to its economic and social development and its location. At the time of the 19th National Congress, the Yangtze River Economic Belt has gained even greater economic and political prominence, indicating that we need to increase investment and investment in the Yangtze River Economic Belt, not only to increase the rate of economic growth, but also to promote the coordinated development of the economy and environmental protection. This is a conclusion reached only after a long period of verification and validation, and is both a grand blueprint for the development of the Yangtze River region and a model for the country's rapid economic development.

Export trade model: The export trade model (ETM), is an export-oriented trade model. A country is a world leader economically and politically, its products meet the needs of domestic and foreign consumers, it produces products with high technological content and high added value, and its exports meet the needs of the domestic market and make profits for the enterprise (Greenaway et al., 2007). As the world's factory, China plays an important role in the world economic system because of its cost-effective, reliable and diverse products. The ETM model is an export-oriented model that takes advantage of China's labour cost advantage to make profits and export products to the market at low cost. Globally, the FMC model is concentrated in Europe and North America.

Export Commodity Structure: Since the 1990s, developed countries in Europe and the US have made continuous adjustments to the structure of China's export commodities to meet the needs of their own markets. Since the mid-1980s, with the rapid development of China's economy and trade following China's accession to the WTO, the search for cheap labour in the world has become an important development strategy choice for Chinese enterprises. With its low labour costs and perfect and considerate services, China has quickly become the world's factory. With the upgrading of the structure of export commodities and the increasing demand for high-tech and high value-added products in the international market, "processing trade as the mainstay, labour-intensive products as a supplement" has become the main mode of restructuring the export commodities of many developed countries (Goos et al., 2014). Therefore, how to seek cooperation with developing countries in terms of labour prices, expand exports and realise the effective combination between the ETM model and the traditional model while maintaining the trade surplus and employment pressure is the key issue facing China's development of the ETM model.

Chapter 3 Research Methodology

3.1 Introduction

This study mainly adopts quantitative research method. This article selects commonly used economic indicators in the vicinity of the Yangtze River Delta for correlation analysis, and constructs a quantitative mathematical model between the two, forming a series of empirical research results, in order to provide reference for enhancing local financial and tax work. This chapter describes the research framework and research design in detail. This paper focuses on the Yangtze River Economic Belt, including Shanghai, Jiangsu, Zhejiang, Anhui, Hubei, Hunan, Jiangxi, Chongqing, Sichuan, Yunnan, Guizhou, a total of nine provinces and two cities (Rekarti et al., 2019). At the same time, this paper will make a comparative analysis of the sustainable development level of manufacturing industry in the Yangtze River Economic Belt from both internal and external aspects; The specific situation of each region, province and city in the Yangtze River Economic Belt is analyzed from the internal comparison, and the strength and position of each province and city in the Yangtze River Economic Belt in the country is analyzed from the external comparison. Based on this, this paper selects 11 provinces and cities in China (except Tibet) as samples for empirical research. Basically, most social studies involve the initial set of hypothetical goals. After all, the Yangtze River Economic Belt is rich in resources and has great potential for coordinated development. However, it has a vast territory, involving multiple local governments, and it is difficult to cooperate between provinces and cities.

In December 2021, the State Administration of market supervision and administration and the National Standardization Administration of China issued the guidelines for the evaluation of low-carbon development level of sustainable development of cities and communities. Carbon emissions, energy, construction and transportation, economy, society, scientific research, policies and regulations, and other indicators are important factors to evaluate the level of low-carbon development of cities. In addition, some scholars have also incorporated indicators such as industrial structure, agricultural production, air quality, water environment, and urbanization rate into the urban low-carbon development evaluation system, which is closely related to urban low-carbon governance. On the basis of combing the relevant concepts of low-carbon cities, this paper selects reasonable factors closely related to carbon governance for double-carbon study and analysis and then grasps the key factors of carbon governance. A low-carbon city is considered to be a city with a low carbon development and operation model economically; citizens adhere to low-carbon concepts and behaviors in life, and the government takes a low-carbon society as its development standard and blueprint. Some scholars believe that the construction of low-carbon cities is to take measures such as changing people's ideas, formulating low-carbon policies, and changing people's lifestyle, with the goal of achieving low-carbon emissions. Aiming at the Yangtze River Delta region, this paper selects nine major cities such as Nanjing, Changzhou, Wuxi, Suzhou, Hangzhou, Ningbo, Wenzhou, and Huzhou for

research and analyzes the factors related to carbon governance in the development process of these major cities. There are many factors involved in carbon dioxide emissions. Of course, its governance should also be comprehensively considered from many aspects. In order to be close to reality and conform to the internal logic, mechanism, and operation mechanism of carbon governance, this paper selects 31 closely related factors for double-carbon study and analysis from five aspects: urban pollution, environmental governance, power consumption, social environment, and economic development. The data used are from the bulletin data of the National Bureau of statistics of China from 2010 to 2019, including China Statistical Yearbook, China Environmental Statistical Yearbook, China Energy Statistical Yearbook, and China Urban Statistical Yearbook. After all, the Yangtze River Economic Belt is rich in resources and has great potential for coordinated development.

This paper mainly adopts literature research, comparative analysis, empirical research and quantitative research.

(1) Quantitative research methods

The quantitative research method was used to determine the sample data, and the data analysis and research were completed by SPSS software (Guiso et al., 2004). data model establishment analysis mainly adopts four methods:1) Descriptive statistical analysis. The descriptive statistics in this paper select 2007-2019 as the research period to ensure that the research results are more convincing.2) Reliability analysis. The indicators collected in this study refer to the existing manufacturing industry classification and the statistical yearbook of important data sources such as China Science and Technology Statistical Yearbook and High-tech Statistical Yearbook (Shao, 2012).

(2)Comparative analysis method.

This study through the Raupach et al (2007) evaluates the level of export manufacturing policies and economic quality development system in 11 provinces of the Yangtze River Economic Belt under the “dual carbon” target, and describes the differentiated evolution path of each province from the temporal latitude.

(3)Empirical Research Methodology.

This paper collected relevant data from 2007-2019 from 11 provinces in the Yangtze River Economic Belt to construct an indicator system to measure the level of export manufacturing policies and economic quality development in each province under the “dual carbon” objective of the Yangtze River Economic Belt, where innovation is an important force for economic growth. In the Yangtze River Economic Belt, there is a strong positive correlation between innovation resources and economic construction, with a correlation coefficient of 0.89.

3.2 Research Design

Since the strategy of the Yangtze River Economic Belt was putting forward, the state has introduced policies and measures to guide and support. The provinces and cities of the Yangtze River Economic Belt have determined their development plans and explored cooperation models according to their own conditions, and have made significant progress and effects. Significant achievements have been made in ecological

construction, the momentum of economic growth has been stable, and people's living standards have been continuously improved (Hanson et al., 2005). The development potential for the Yangtze River Economic Belt has not been fully exploited, and the development effect is still far from the ideal state.

The Yangtze River is the mother river of the Chinese nation, and the ecological environment protection of the Yangtze River Economic Belt is related to the long-term interests of the whole nation. Therefore, the state has formulated the guidance of "jointly grasping the major protection and not engaging in the major development", and 11 provinces and cities along the Yangtze River have taken action to promote the ecological environment protection and construction. However, there are many historical burdens of ecological environment damage, the damage is deeper, and it is difficult to control. The high energy consumption and high pollution industries in the Yangtze River Economic Belt account for a large proportion. The discharge of pollutants in lakes and rivers is serious, the discharge load of air pollutants is large, and the disposal capacity of solid waste pollution is insufficient.

Among the Xu et al. (2019) exporting countries and regions in the middle reaches of the Yangtze River, Asia has the largest share, accounting for 53.74%, followed by the Americas, Europe and Africa, accounting for 23.53%, 16.16% and 4.54% respectively. Among Asian countries, South Korea, Japan, India and Malaysia have the largest trade volume. In 2016, the value of goods exported from the Yangtze River Delta to South Korea was 3,961,227,200 dollars. Among and Abdullah (2019) analysis European and American countries, the export trade to the United States and Germany is relatively large, which was 16,279,430,600 US dollars and 2,738,271,500 US dollars respectively in 2016. It can be seen that most of the trade objects with the middle reaches of the Yangtze River are developed countries, especially the United States. However, compared with the Yangtze River Delta region, the analysis of the export regions in the middle reaches of the Yangtze River shows that the export regions in Chengdu Chongqing region have a trend of transformation to developing countries.

Among the exporting countries and regions in Chengdu Chongqing region, Asia accounts for the largest proportion, followed by the Americas, Europe and Africa, with their respective proportions of 45.93%, 26.13% and 20.64%. Among Asian countries, Vietnam, Thailand, Japan and Malaysia have the largest trade volume. In 2016, the value of goods exported from the Yangtze River Delta to Vietnam was 317.229 million dollars, and the value of goods exported to Thailand was 2613.69 million dollars (Zhang et al., 2022). It can be seen that, compared with the Yangtze River Delta and the middle reaches of the Yangtze River, the trend of export trade objects in Chengdu Chongqing region shifting to developing countries is more obvious.

For a long time, economic construction has been at the core of various activities of local governments. For economic development, local governments can make various compromises. For example, "pollution before treatment" has become the choice of many local governments. The same problem exist in all provinces and cities of the Yangtze River Economic Belt.

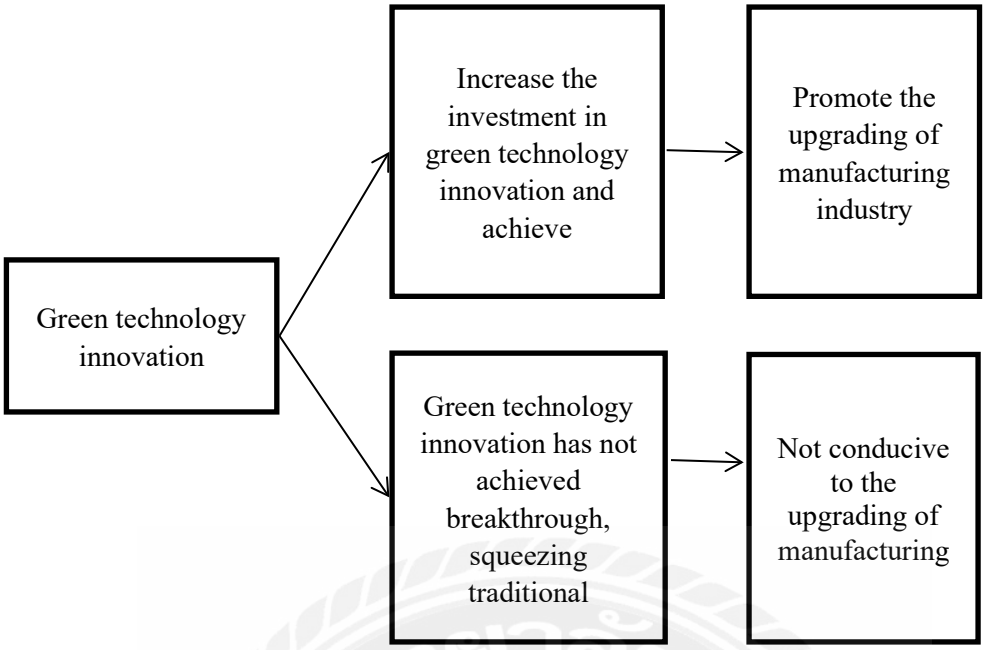

Figure 3-1 The Impact of Green Technological Innovation on Manufacturing

There is a negative correlation between ecological construction and economic construction. Economic development often takes ecological damage as the cost. In Raupac et al. (2007), with the implementation of the Yangtze River Economic Belt Strategy, the relationship between ecological construction and economic construction has changed from negative correlation to weak positive correlation, but the speed of transformation is not enough, and the absolute value is far from satisfactory. Therefore, strengthen the innovation of green technology.

Therefore, in terms of the structure of export regions, the main export regions of the Yangtze River Economic Belt are basically developed countries, such as the United States, Germany, Japan, etc. However, from the perspective of sub regions, from the Yangtze River Delta region to the middle reaches of the Yangtze River region and then to Chengdu Chongqing region, its trade partners are gradually shifting to developing countries. Especially Thailand, India, Vietnam, Malaysia and other countries.

3.3 Hypothesis

The "dual carbon" target will create a mechanism for structural optimisation and upgrading, leading to a shift in industrial development towards quality and efficiency, which will have a profound impact on the structural change of export manufacturing policies in the Yangtze River Economic Zone. In terms of world carbon emissions, China is the world's largest emitter of greenhouse gases, and energy consumption generates more greenhouse gases, with manufacturing industries accounting for a larger share of carbon emissions. Therefore, in order to achieve the goal of "dual carbon", we must comprehensively build a clean and low-carbon production system, which is also an important way for China's manufacturing industry to improve the green

competitiveness of products and achieve high-quality development. In China's future energy structure, the proportion of clean and green renewable energy will be significantly increased, and the new energy industry chain is becoming more and more perfect, which will certainly cause the relevant equipment manufacturing to green intelligent transformation. From Burgess and Paguio (2016) industrial layout, with the application of advanced energy storage technology and the optimisation of the energy consumption structure, the supply of fossil fuels such as coal will gradually decrease, the utilisation of new and renewable energy sources such as wind power and nuclear hydrogen will increase, and the green production chain and low-carbon value chain of the manufacturing industry will gradually take shape, ultimately promoting the low-carbon optimisation of the industrial structure (Wu, 2019). Therefore, based on China's mega market advantage and certain existing low-carbon industrial advantages, we should promote the optimization of energy structure, industrial restructuring and energy efficiency improvement of key manufacturing industries, so that the growth rate of total carbon emissions will become slower.

Based on this, the following hypothesis is proposed:

H1: Carbon emission reduction under the "dual carbon" target will lead to green technology innovation, which in turn will significantly contribute to the high-quality development of export manufacturing policies in the Yangtze River Economic Zone.

The "dual carbon" target is conducive to the formation of a low-carbon development model. China's “dual carbon” target is to place climate governance and green development of environmental protection industries on an equal strategic footing, i.e. to promote the green and low-carbon transformation of industries and guide the high-quality development of manufacturing industries with carbon peaking as a necessary condition. At the same time, to use advanced technologies to reduce carbon emissions at the source of industries and to integrate them throughout the industrial development process (Yao et al., 2022). At the same time, advanced technologies are used to reduce carbon emissions at the source of the industry, and this is carried through the whole industrial development process, prompting an effective shift from end-of-pipe management to focus on source prevention and source management.

Based on this, the following hypotheses are proposed.

H2: The "dual carbon" target is conducive to the optimization of the policy structure of the export manufacturing industry in the Yangtze River Economic Zone, thus achieving a green transformation.

Based on the above analysis and understanding, the article will build an empirical model to measure the quality of China's manufacturing development through the construction of a comprehensive evaluation index system, based on the empirical analysis of Pasche (2002): “dual carbon” target driven by carbon emission reduction in the export manufacturing policy of the Yangtze River Economic Belt, and the use of the model to measure the quality of China's manufacturing development. The model is also used to empirically analyze the mechanisms underlying the high-quality development of export manufacturing policies in the Yangtze River Economic Belt driven by the "dual carbon" target.

3.4 Population and Sampling

The sample size is calculated by understanding the operating status and development trend of manufacturing enterprises, hoping to analyze whether relevant variables are valid according to the sample.In order to test the impact of carbon emission reduction on the development quality of manufacturing industry under the "dual-carbon" target, carbon emission intensity is included in the research framework of high-quality development of manufacturing industry. The base model is constructed as follows:

$$\ln MDL_{it} = \beta_0 + \beta_1 \ln CE_{it} + \sum \gamma_j x_{jit} + \delta_t + \varepsilon_{it} \quad (1)$$

In equation (1): i stands for region; t stands for time; MDL is the explained variable explanatory variable, representing the quality of manufacturing development; CE is the core explanatory variable, representing carbon emissions intensity; xjit represents the selected set of control variables; β0 is the intercept term; δt is the time fixed effect; and εit is the is the random disturbance term. The same variables in the following equation remain unchanged (Movid, 2018). Under the “dual carbon” objective, carbon emission reduction will lead to green technology innovation, which in turn will have a positive impact on the quality development of the manufacturing industry (Raupach et al., 2007). The same variables in the equation are constant. Therefore, the impact of carbon emission reduction on the quality development of the manufacturing industry under the “dual carbon” target is likely to be based on the "green technology" approach. The impact of carbon emission reduction on the quality development of the manufacturing industry under the “dual carbon” target may be mediated by the "green technology innovation" variable. The data are from China Industrial Statistical Yearbook (2012-2020), and the remaining data are from China Statistical Yearbook (2012-2020) and Provincial Statistical Yearbook (2005-2015). In addition, the absence of some raw data was estimated by the interpolation method.

3.5 Sample Size

Stratified random sampling method was used in this study. Compared with commonly used simple random sampling, stratified random sampling can significantly improve the accuracy (Shao, 2020). By comparing the green level in 2019, from high to low ranking, overall, Shanghai is the middle reaches of the Yangtze River Economic Belt, Jiangsu is the downstream province, and Chongqing and Sichuan are the centers of the Chengdu-Chongqing twin city economic circle. In addition, 510 questionnaires were collected to investigate and analyze the data of 10 provinces in the Yangtze River Economic Belt from 2007 to 2019, and an indicator system was constructed to measure the development level of export manufacturing policies and economic quality of the Yangtze River Economic Belt under the "dual carbon" goal of each province. A total of 516 questionnaires were distributed. The effective rate reached 98.83%.

3.6 Data Collection

The original data of the study came from analyzing the operation of export manufacturing enterprises in 11 provinces and cities along the Yangtze River Economic Belt from 2007 to 2019 by designing questionnaires. After collecting questionnaires, spss analysis was carried out on the questionnaires to estimate the comprehensive scores of export manufacturing policies and high-quality economic development of provinces along the Yangtze River Economic Belt. The descriptive analysis of the economic data of the provinces in the Yangtze River Economic Belt in the past 10 years shows that under the "dual carbon" goal, the quality development of the provinces shows an overall growth trend, but the quality development level varies greatly among provinces, which indicates that the export manufacturing policies of the provinces in the Yangtze River Economic Belt have greatly improved the economic quality (Luo et al., 2020).

3.7 Data Analysis

Once the sample data is determined, SPSS software will be used to analyze and study the data. The output indicators selected mainly include two types: one is the conceptual indicators of added value, such as GDP or industrial added value; Second, scale indicators, such as gross industrial output value. However, in the process of manufacturing production, it includes not only added value, but also intermediate input, and the value of gross industrial output value includes not only added value, but also intermediate value. Therefore, this paper chooses the gross industrial output value as the output index. This paper adjusts the gross industrial output value to the fixed price in the reference period through the ex-factory price index of industrial products.

The verification of the new factor analysis is to test the hypothesis proposed by researchers, test the matching measurement items of a factor at the level of theoretical relationship, and emphasize the reliability of the theoretical analysis results (Kromann et al., 2019). In order to ensure that the results of the analysis data are accurate and practical, and the level of statistical ability reaches 80%, at least 200 samples are needed. This paper uses the experience of previous studies for reference to use intermediate inputs as production factors such as energy or other resources. A total of 510 questionnaires data are collected this time.

And perform the construct validity. The structure validity test of economic data was determined by the results of KMO test (KMO value> 0.7) and Bartlett's spherical test (P <0.01). The relevant data collected this time need to be applied through research methods, which provide sufficient theoretical basis and analytical thinking to a certain extent, and also lay a solid foundation for subsequent empirical research.

3.8 Reliability and Validity analysis of the scale

Scholars often use the reliability coefficient to express the reliability level of the data or the measurement tool. At present, Cronbach 'α is the most commonly used reliability measurement method. As long as the Cronbach' α coefficient is higher than 0.7, the scale and data can be considered available. Validity, as the standard to test whether the selected scale can be used to measure the variables, is divided into structure

validity and content validity. Structure validity refers to whether the test scale is reasonable, and content validity refers to the rationality of the text used to state the scale. In general, the academic community believes that a KMO with a value above 0.7 can only be accepted (Graetz & Michaels, 2018).

TABLE 3-1 Reliability analysis

Item	CITC	Delete the Cronbach's'α value for the item	Cronbach's ' α
Under the "dual carbon" target, carbon emission reduction promotes green technology innovation, which then plays a significant role in promoting the high-quality development of export manufacturing policies in the Yangtze River Economic Belt.	0.783	0.869	0.889
The "dual carbon" goal is conducive to promoting the optimization of the export manufacturing policy structure in the Yangtze River Economic Belt, so as to realize the green transformation.	0.827	0.831	

As you can see from Table 3-1 above, the Cronbach's ' α of this study is 0.889, which meets the criteria. In addition, most of the CITs between the observed variables and their latent variables are between 0.6 and 0.8, indicating that the export manufacturing policy and high-quality economic development level of the Yangtze River Economic Belt under the "dual carbon" target. affects the data model establishment reliability under the background of network economy. In conclusion, the reliability coefficient values of the data in this study are greater than 0.6, indicating that the reliability quality of the data is acceptable.

Finally, using exploratory factor analysis for structural validity analysis, first according to the KMO value and Bartlett's spherical test assessment scale is suitable for factor analysis, KMO value between 0~1, the more close to 1, the stronger the correlation between the variables, the better the effect of factor analysis, Bartlett's spherical test is used to determine the correlation coefficient matrix is unit matrix, namely test whether independent between each variables, generally, the feasibility test of exploratory factor analysis should meet two conditions: 1. KMO> 0.7; 2. Bartlett's spherical test is significant (Sig. <0.05), and the results are shown below.

TABLE 3-2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.842
Bartlett's Test of Sphericity	Approx. Chi-Square	10432.871
	df	2983
	Sig.	0.000

After passing the KMO test, it can be more clear whether the financial data collected by this research is valid, so as to conduct a good in-depth analysis.As can be seen from the above table, KMO is 0.842, greater than 0.6, meeting the premise requirements of factor analysis, and the validity of this study was tested by Spearman rank correlation analysis using SC-RMDQ as a control. The results showed that the economic data collected this time had a good correlation ($r= -0.371$, $P <0.01$).

Chapter 4 Result of the Study

4.1 Introduction

The completed data model establishment in this chapter consists of two parts, one focusing on the processing of the relevant variables and the other on basic information about the research participants. This chapter focuses on the detailed analysis of the valid data model establishment data collected that meet the research criteria, and the analysis and discussion of the research questions and hypotheses presented in Chapter 2. This chapter will use relevant software to make specific analyses of the variables, including demographic analysis and reliability analysis, to derive the relationship between variables and variables, and then test the hypotheses put forward in Chapter 2.

4.2 Description of statistical variables

The original data was obtained from the China Statistical Yearbook, the China Energy Statistical Yearbook, the China Science and Technology Statistical Yearbook, the China Urban Statistical Yearbook, the official website of the State Intellectual Property Patent Office and provincial statistical yearbooks. The specific variables are set out below.

Explained variable: the quality of manufacturing development (MDL). The "Made in China 2025" proposes that the export manufacturing policy and the high quality development level of the economy in the Yangtze River Economic Zone under the "dual carbon" target. The study is based on the economic and social development of the economy. On the basis of this study, a comprehensive evaluation index system for the development quality of export manufacturing policies and economic quality development in the Yangtze River Economic Zone under the goal of "dual carbon" was constructed in five aspects, including economic efficiency, technological innovation, green development, structural optimisation and social benefits; the entropy weight method was also used to measure the quality of development. This method is simple, objective and accurate.

The analysis of the impact of carbon emission reduction on the export manufacturing policy and the development quality of high-quality economic development level of the Yangtze River Economic Belt under the "dual carbon" goal is to ensure that the estimator of regression parameters shows a good statistical nature, while taking into account the possible impact of random factors between explanatory variables and explained variables, The least square method is used to conduct regression analysis on the relationship between the export manufacturing policy of the Yangtze River Economic Belt and the development quality of high-quality economic development under the carbon emissions and the "dual carbon" target. The benchmark results are shown in Table 4-1.

TABLE 4-1 Statistical description of the related variables

Variable	Sample number	Mean value	Standard deviation	Minimum	Maximum
nmdl	510	-1.4592	0.3246	-2.4753	-0.6861
nmso	510	-2.8664	1.0076	-6.075 2	-0.3925
Ince	510	0.8643	0.7271	-1.4835	4.3552
ngti	510	6.6357	1.7612	1.6095	10.3548
nedu	510	2.1641	0.1218	1.8536	2.9835
ngov	510	-1.588 2	0.4095	-2.5672	-0.4422
neco	510	9.3991	1.0336	6.1327	11.6151
nlal)	510	4.4210	1.0447	1.9026	6.9283
ninv	510	-1.1146	0.3218	-2.7242	-0.6068
nexp	510	-2.4273	1.0076	-5.4732	-0.0049

Explanatory variable: Carbon Emission Intensity (CE). Carbon emission intensity is measured as the core explanatory variable for the impact of carbon emission reduction on the quality of development of export manufacturing policies and the level of quality economic development in the Yangtze River Economic Zone under the “dual carbon” target, measured by carbon emissions per unit of GDP.

The quality state level of the sustainable development of the manufacturing industry in the Yangtze River Economic Belt has risen steadily. According to Table 4-2, the quality status level score for the sustainable development of the manufacturing industry in the Yangtze River Economic Belt rose from 0.2917 in 2009 to 2015 the year 0.3397 shows that the sustainable development of manufacturing industry in the Yangtze River Economic Belt has achieved certain results and the development trend Keep improving.

TABLE 4-2 Quality status level of sustainable development of manufacturing industry in the Yangtze River Economic Belt in 2009-2020

Time	Optimum structure	Innovation-driven	Efficient allocation of resources	Ecological environmental protection	Dual carbon conditions	Outstanding benefits	Quality level
2009	0.2712	0.2151	0.2673	0.6935	0.2704	0.5623	0.2917
2010	0.2958	0.2279	0.2752	0.7393	0.2572	0.5550	0.2994
2011	0.3065	0.2414	0.2865	0.7722	0.2535	0.5331	0.3056
2012	0.3274	0.2635	0.2907	0.7910	0.2500	0.5224	0.3165
2013	0.3553	0.2828	0.2938	0.7910	0.2337	0.5049	0.3262
2014	0.3860	0.3057	0.3091	0.8508	0.2293	0.4579	0.3397
2015	0.3872	0.2624	0.2287	0.7722	0.2737	0.7331	0.3028
2016	0.32724	0.22837	0.2907	0.791	0.27	0.7224	0.3187
2017	0.3773	0.2828	0.2938	0.768	0.3527	0.7029	0.3282
2018	0.3828	0.3077	0.3091	0.8708	0.2533	0.2479	0.3397
2019	0.3426	0.22834	0.2904	0.491	0.24	0.4224	0.3184
2020	0.3353	0.2928	0.2939	0.465	0.2524	0.4029	0.3682

Mediating variable: Green Technology Innovation (GTI). The number of green patents in each province, region and city in different years was obtained from the patent search platform of the State Intellectual Property Office to measure the level of green technology innovation in each region, following the practice of the "Dual Carbon" target is a structural upgrade of the export manufacturing policy and the level of quality economic development in the Yangtze River Economic Zone (MSO). The Sixth Plenary Session of the 19th CPC Central Committee proposed to accelerate the implementation of the 14th Five-Year Plan, maintain a stable share of export manufacturing policies and high quality economic development in the Yangtze River Economic Zone under the "dual carbon" target, enhance industrial innovation capacity, strengthen the supply chain of the industrial chain, and promote structural optimisation. The "Dual Carbon" target is to maintain a stable share of the Yangtze River Economic Zone's export manufacturing policy and high quality economic development, enhance industrial innovation capacity, strengthen the stability and competitiveness of the industrial supply chain, promote structural optimisation and upgrading and industrial carbon peaking, and strive to create a new situation of a strong manufacturing country. It can be seen that the “dual carbon” target is a turning point for China to achieve peak carbon by optimising and upgrading the structure of export manufacturing policies and high quality economic development in the Yangtze River Economic Zone. Therefore, this paper uses the proportion of the total output value of the export manufacturing policy and economic quality development level in the Yangtze River Economic Zone under the “dual carbon” target as a measure of the total output value of the export manufacturing policy and economic quality development level in the Yangtze River Economic Zone under the "dual carbon" target. To measure the extent to which the structure of export manufacturing policies and the level of quality development of the economy in the Yangtze River Economic Zone under the 'dual carbon' target has been upgraded.

4.3 Calculation and analysis of status evaluation of the manufacturing industry in the Yangtze River Economic Belt

Based on the evaluation index data of high quality development quality status level of manufacturing industry in 2007-2019 in 10 provinces, this paper calculates the mapping value of 1-9 scale and the weight of hierarchical index, shown in Table 4-3 and Table 4-4).

TABLE 4-3 Mapping values of the 1-9 scale of high quality development quality state level in manufacturing

Scale	1	2	3	4	5	6	7	8	9
Mapping value	1	2.0552	3.1680	4.3407	5.5757	6.8756	8.2431	9.6809	11.1918

TABLE 4-4 Weight of evaluation indicators of high quality development quality status level of manufacturing industry

Level 1 indicators	B1 structural optimization					
weight	0.2757					
Secondary indicators	C1 Product structure optimization		C2 enterprise structure optimization			C3 industry structure optimization
weight	0.0467		0.1693			0.0597
Level 3 indicators	D1	D2	D3	D4	D5	D6
weight	0.0173	0.0294	0.0499	0.0597	0.0597	0.0597
Level 1 indicators	B2 Innovation-driven drive					
weight	0.2592					
Secondary indicators	C4 Level of innovation investment		C5 innovation output level			
weight	0.1225		0.1367			
Level 3 indicators	D 7	D 8	D 9	D 10		D 11
weight	0.0601	0.0624	0.0276	0.0601		0.0491
Level 1 indicators	B3 efficient resource allocation					
weight	0.1588					
Secondary indicators	C6 Efficiency of capital allocation		C7 Efficiency of labor allocation	C8 Efficiency of energy allocation		C9 The efficiency of land allocation
weight	0.0613		0.0341	0.0294		0.0341
Level 3 indicators	D 12		D 13	D 14		D 15
weight	0.0613		0.0341	0.0294		0.0341

According to the weight of each dimension, structural optimization has the largest proportion in the three dimensions, the weight reached 0.2757; Second, innovation-driven, with a weight of 0.2592, efficient resource allocation and outstanding benefits are in the medium position, The weights were 0.1588 and 0.1293, respectively; As can be seen from the information reflected by the weight, In the process of high-quality development of the manufacturing industry, the effect of the industrial structure upgrading is the most obvious, this also verifies that China has continued to promote the transformation and upgrading of the manufacturing industry in recent years; at the same time, the weight of innovation drive is in the second place and it shows how much importance China attaches to innovation capabilities. Is the primary driving force for the high-quality development of the manufacturing industry, It shows that this index can well measure the quality state level of high quality development of manufacturing industry; The lowest weight of ecological and environmental protection shows that China also needs to vigorously promote the environmental protection level in the

process of manufacturing development, the importance of environmental protection needs to be strengthened; The other indicators contribute to the high-quality development and quality status level of the manufacturing industry to varying degrees; This shows that the evaluation index system constructed in this paper is reasonable, it can objectively evaluate the high-quality development and quality level of the manufacturing industry in the Yangtze River Economic Belt and even the whole country.

Based on the weight results combined with the TOPSIS model, the final evaluation results of 10 provinces and cities from 2007 to 2019 were calculated. Based on this, the high-quality development level of the manufacturing industry in the Yangtze River Economic Belt is compared and analyzed from the inside and the outside.

4.4 Internal comparative analysis

(1) Analysis of the quality status and level of the Yangtze River Economic Belt

① global analysis

The quality level of high-quality development of manufacturing industries in the Yangtze River Economic Belt has risen steadily. According to Table 4-5, the quality score of the state of the high-quality development of the manufacturing industry in the Yangtze River Economic Belt has increased from 0.2917 in 2007 to 0.3860 in 2019, indicating that the high-quality development of the manufacturing industry in the Yangtze River Economic Belt has achieved certain results, and the development trend is constantly improving.

TABLE 4-5 Quality Status level of high-quality development of manufacturing industry in the Yangtze River Economic Belt in 2011-2016

Time	Optimum structure	Innovation-driven	Efficient allocation of resources	Quality status level
2007-2009	0.2712	0.2151	0.2673	0.2917
2009-2012	0.2958	0.2279	0.2752	0.2994
2012-2014	0.3065	0.2414	0.2865	0.3056
2014-2016	0.3274	0.2635	0.2907	0.3165
2016-2019	0.3860	0.3057	0.3091	0.3397

② Subdivision dimension analysis

From the perspective of subdivision, structural optimization, innovation-driven and efficient resource allocation have witnessed steady growth. According to Table 4-5, the structural optimization evaluation value increased from 0.2712 to 0.3860 in 2007-2019, the innovation drive increased from 0.2151 to 0.3057, and the efficient resource allocation increased from 0.2673 to 0.3091, indicating that the industrial structure of the manufacturing industry in the Yangtze River Economic Belt has been optimized, the innovation capacity has been strengthened, and the resource allocation efficiency is more efficient, which provides a relatively high-quality and stable development

foundation for the high-quality development of the manufacturing industry. It should not be ignored that China is still in the stage of industrialization and still needs to focus on the development of the manufacturing industry, actively promote the integrated development of the manufacturing and service industries, and boost the high-quality development of the manufacturing industry with the advantages of integrated development.

(2) Analysis of the quality status level in the lower reaches, middle reaches and upper reaches of the Yangtze River Economic Belt

① global analysis

From 2007 to 2019, the quality level of the manufacturing industry in the lower reaches, middle reaches and upper reaches of the Yangtze River Economic Belt all increased steadily, showing the development state of "high in the downstream and low in the middle and upper reaches", and the development gap between the middle and lower reaches and the upper reaches was gradually widening. According to Table 4-6, the quality state level of high-quality development of downstream, midstream and upstream in 2007-2019, from 0.4387 to 0.4945,0.2418 to 0.2969 in the midstream and 0.2298 to 0.2665; it is not difficult to find that the score of the downstream is much higher than the midstream and the Yangtze River Economic Belt, but lower than the Yangtze River Economic Belt; in general, the development pattern is high quality level, midstream and lower. From the perspective of the three regional development gap, the gap between the downstream and midstream remains almost unchanged, but the gap between the downstream and upstream rose from 0.2090 in 2007 to 0.2279 in 2019, and the gap between the midstream and upstream rose from 0.0120 to 0.0304. This trend shows that the development gap between the upstream, midstream and downstream is gradually widening, which will further aggravate the trend of unbalanced development.

TABLE 4-6 Quality status level of manufacturing industry in the lower reaches, middle reaches and upper reaches of the Yangtze River Economic Belt in 2007-2019

Time	Downstream area	Midstream area	Upstream area
2011	0.4387	0.2418	0.2298
2012	0.4467	0.2516	0.2368
2013	0.4504	0.2637	0.2389
2014	0.4641	0.2713	0.2511
2015	0.4761	0.2817	0.2584
2016	0.4945	0.2969	0.2665

From the perspective of structural optimization, the structural optimization level of the three major regions of the Yangtze River Economic Belt is rising steadily, and the structural optimization level of the lower reaches is much higher than that of the middle and upper reaches, and there is little difference between the middle and upper reaches. From 2011 to 2016, in the lower reaches of the Yangtze River Economic Belt,

the value of structural optimization increased from 0.3859 to 0.5023, the middle reaches from 0.2129 to 0.3373, and the upstream region from 0.2375 to 0.3474, indicating the continuous optimization of the manufacturing structure in the three regions. It should not be ignored that the upstream is slightly higher than the midstream, mainly because the industry structure of the midstream is not excellent; for example, the sales revenue of high-tech manufacturing accounted for 9.48% in 2019, lower than the upstream 12.22%. Therefore, the midstream should accelerate the adjustment of industrial structure.

According to the analysis of each dimensions, the three dimensions of the Yangtze River Economic Belt differ significantly, and the downstream occupies an absolute advantage. Except for ecological environmental protection, the evaluation value of the other dimensions of downstream quality state is much higher than that of the middle and upstream; while the difference between the middle and downstream mainly comes from the two dimensions of innovation-driven and outstanding efficiency.

(3) Analysis of the quality status level of the provinces and cities in the Yangtze River Economic Belt

① global analysis

From the perspective of development trend, the quality status level of manufacturing industry in all provinces and cities along the Yangtze River Economic Belt shows an upward trend, which can be divided into stable growth and fluctuating growth. According to Table 4-7, 2007-2019 Shanghai, Jiangsu, Zhejiang, Chongqing, Anhui, Hunan and Hubei are all stable growth types, Shanghai rose to 0.6100 from 0.5513, Jiangsu rose to 0.4545 from 0.4097, Zhejiang rose from 0.3553 to 0.4189, Chongqing from 0.2947 liter 0.3535, Anhui rose from 0.2403 to 0.3352, Hunan rose from 0.2487 to 0.3083, Hubei rose from 0.2626 to 0.2910, This shows that the foundation of high-quality manufacturing development in these provinces and cities is relatively stable, Continue to promote the development of manufacturing industry; at the same time, It is worth noting that, These areas are mainly located in the lower and middle reaches, Have a more superior geographical location and a better quality economic base than the upstream, So the growth state of these provinces and cities is relatively stable. And Sichuan, Jiangxi, Guizhou, Yunnan in rising state, these areas are mainly located in the upstream, away from the economically developed downstream coastal areas, due to the geographical location, terrain conditions, economic development level, and many other conditions, manufacturing development foundation is weak, in the process of development is relatively vulnerable to the influence of the outside world, lead to quality state level fluctuation growth.

TABLE 4-7 Quality status level of all provinces and cities in the Yangtze River Economic Belt from 2007 to 2019

Province	2007-2009	2009-2012	2012-2014	2014-2016	2016-2019
Shanghai	0.5413	0.5570	0.5617	0.5834	0.6393
Jiangsu	0.4097	0.4192	0.4153	0.4245	0.4362

Zhejiang	0.3553	0.3638	0.3743	0.3844	0.4029
Chongqing	0.2947	0.3024	0.3172	0.3330	0.3478
Anhui	0.2403	0.2591	0.2693	0.2919	0.3160
Hunan	0.2487	0.2640	0.2728	0.2825	0.2955
Hubei	0.2626	0.2598	0.2643	0.2652	0.2775
Sichuan	0.2262	0.2337	0.2430	0.2587	0.2518
Jiangxi	0.2224	0.2236	0.2485	0.2454	0.2378
Yunnan	0.1920	0.1997	0.1970	0.2052	0.2322
Guizhou	0.2062	0.2114	0.1984	0.2074	0.2016

From the perspective of the evolution trend, the development pattern of "one main and two auxiliary" in Shanghai, Jiangsu and Zhejiang has gradually formed a development situation with Shanghai as the leader, Jiangsu and Zhejiang as the main force, and Chongqing, Anhui and Hunan rising strongly. According to Table 4-7, The state level of high quality development of manufacturing industry in provinces and cities along the Yangtze River Economic Belt presents the evolution of space-time differentiation; From 2007 to 2011, Shanghai's manufacturing industry ranked first in the Yangtze River Economic Belt with a high score of 0.5413, Far higher than any other provinces and cities in the Yangtze River Economic Belt, Is the Yangtze River Economic Belt manufacturing industry in the high-quality development is worthy of the leading; Jiangsu and Zhejiang were followed by 0.4097 and 0.3553, respectively, To become two auxiliary cities to promote high-quality development of the Yangtze River Economic Belt, Compared with the development of other cities, In addition to the slightly better development in Chongqing, The development level of other cities is not high. In 2019, Shanghai is still ranked first with a high score of 0.6393, while Jiangsu and Zhejiang are still the two main forces in promoting the high-quality development of the Yangtze River Economic Belt.

4.5 External comparative analysis of the status evaluation results of the Yangtze River Economic Belt

Above has clear within the provinces of the development differences and the existing problems, to clarify the quality level of the Yangtze river economic belt in the national level and existing level, this paper selected 2019 10 provinces and cities on the state of the development of the high quality manufacturing level evaluation, specific measurement results as shown in table 4-8:

TABLE 4-8 All dimensions and quality status levels of manufacturing industry in 10 provinces and cities in China in 2019

Province	Optimum structure	Innovation-driven	Efficient in resource allocation	Outstanding benefits	Quality status level
	Evaluation of	Evaluation	Evaluation of	Evaluation of	Evaluation of

	estimate	of estimate	estimate	estimate	estimate
Beijing	0.8303	0.8305	0.6418	0.3829	0.6580
Shanghai	0.5027	0.5358	0.6643	0.5460	0.6100
Tianjin	0.5492	0.4685	0.3793	0.7054	0.4899
Guangdong	0.5511	0.4088	0.3411	0.6405	0.4889
Jiangsu	0.5417	0.3814	0.3112	0.6531	0.4545
Zhejiang	0.4625	0.4133	0.3162	0.6103	0.4189
Hainan	0.3924	0.3020	0.3358	0.2605	0.3792
Anhui	0.3243	0.4294	0.2471	0.5401	0.3352
Hunan	0.3454	0.3019	0.3227	0.5465	0.3083
Fujian	0.3206	0.1917	0.3497	0.5258	0.3082

It is worth noting that the quality level of Beijing and Shanghai is much higher than that of other provinces of the same type, which belongs to the ultra-high quality type and the two provinces with the best high quality development level of Chinese manufacturing industry; the outstanding evaluation of the two ultra-high quality type is at the end of the same category. Mainly in the contribution rate of output value and employment are not high, Beijing is 15.69% and 7.07% respectively, Shanghai is 26.81% and 16.97% respectively, far lower than Tianjin 38.04% and 31.60%, which is closely related to the economic development of two provinces and cities and international financial center, the overall industrial structure level is high, and the service industry is relatively developed. At the same time, compared with manufacturing industry, the people engaged in service industry is relatively large, so the contribution of its manufacturing industry to employment is not particularly high. In general, this type of provinces and cities have a good development environment, and they need to make full use of the existing environmental foundation to promote the high-quality development of the manufacturing industry.

And the Yangtze river economic belt total factor productivity growth overall situation in a state of growth, leading by technical efficiency, so about the Yangtze river economic belt system coordination evaluation results external comparative analysis also selected 10 provinces and cities manufacturing quality development system coordination evaluation results comparative analysis, to clarify the Yangtze river economic belt provinces and cities system coordination in the status of the country, the specific measure of system coordinated development results as shown in table 4-9:

TABLE 4-9 Coordinated development degree and ranking of high-quality manufacturing development system in 10 provinces and cities in China in 2019

Area	Coordinated development	Ranking	Coordinated development level
Beijing	0.893	1	Highly coordinated
Shanghai	0.851	2	Highly coordinated

Tianjin	0.825	3	Highly coordinated
Jiangsu	0.805	4	Highly coordinated
Guangdong	0.799	5	Moderate coordination
Zhejiang	0.762	6	Moderate coordination
Hainan	0.747	7	Moderate coordination
Chongqing	0.698	8	Moderate coordination
Anhui	0.693	9	Moderate coordination
Fujian	0.673	10	Moderate coordination
Hunan	0.643	13	Moderate coordination

In 2019, the coordinated development of China's high-quality manufacturing development system was not high. According to Table 4-9, more than 50% of provinces and cities are in a state of low-degree coordinated development, while only 13% of highly coordinated provinces and cities account for it. This is mainly due to the low state and process level of high-quality development of manufacturing industry in most provinces in China, and the system coordination is not high, which leads to the lack of high-quality development of China's manufacturing industry. Therefore, to promote the high-quality development of China's manufacturing industry, it is necessary to comprehensively promote the status and process level of the infrastructure, structure level, innovation ability, opening level and other measures of China's manufacturing industry.

4.6 Discussion

4.6.1 Promote the optimization of export commodity structure

According to the previous analysis, in terms of export commodities, China's industrial manufactured products have reached a higher level, and the electromechanical products and high-tech products are increasing year by year. However, the products in the middle reaches of the Yangtze River and Chengdu Chongqing are mainly assembled or produced by simple labor (Graetz & Michaels, 2018). Under the background of economic globalization at this time, if you want to take a share in the international trade market where the law of the jungle is the law of the jungle, you must increase the added value of your own products in order to gain a place in the strong market competition. Therefore, enterprises should seize excellent technical talents, increase investment in R&D, attach importance to the technological development of their own enterprises, and accelerate the import of foreign excellent precision technology.

4.6.2 Optimize the main structure of export trade and strengthen the training of trade talents

The main body of export trade in the Yangtze River Economic Belt are mainly private enterprises, followed by state-owned enterprises and foreign-funded enterprises.

However, in the process of foreign trade development, transnational enterprises have certain advantages. Therefore, as the most active export enterprises, private enterprises should also develop towards transnational enterprises and form China's unique private enterprise foreign trade exchange network system internationally. At the same time, as a private enterprise, in the process of international trade, it is easy to be affected by the political policies of the other country. After all, the strength of fighting alone is limited. The united front can make China's export trade have a brighter future.

4.6.3 Promote diversified regional distribution of export trade

The export targets regions and countries of the Yangtze River Economic Belt are basically concentrated in developed countries, such as Japan and South Korea in Asia, the United States in the Americas, Germany and the Netherlands in Europe. The export trade of the Yangtze River Economic Belt only depends on these few developed countries. Maybe a small trade friction will have a huge impact on China's export trade. In contrast, among the exporting countries in the middle reaches of the Yangtze River and Chengdu Chongqing region, the proportion of developing countries is rising, which has greater advantages. Therefore, enterprises located in the Yangtze River Economic Belt should adjust measures to local conditions, produce different products according to their own conditions, pay more attention to the market of developing countries, balance the market structure, comprehensively reduce the risk of export trade, and ensure the stability of export trade.

4.7 Results of the Study

Specific activities are shown in Table 4-10 below:

TABLE 4-10 Study hypothesis validation table

No	Hypothesis	Result
H1	Carbon emission reduction under the "dual carbon" target will lead to green technology innovation, which in turn will significantly contribute to the high-quality development of export manufacturing policies in the Yangtze River Economic Zone.	Establish
H2	The "dual carbon" target is conducive to the optimization of the policy structure of the export manufacturing industry in the Yangtze River Economic Zone, thus achieving a green transformation.	Establish

Combined with data analysis, the level of economic and social development of a region can, to a large extent, have a significant impact on regional green technology innovation. Regions with a higher level of economic development are able to raise the technological level of export manufacturing policies and the level of quality economic development in the Yangtze River Economic Zone under the regional "d carbon" target through a series of large-scale governmental support for R&D. At the same time, within

the region, industrial capital and technology spillover from one region to another play a significant role in promoting industrial technological progress within the region. The Yangtze River Economic Zone has a better export product policy and higher quality of economic development than other regions.

In the first stage, the impact of export manufacturing policies on green technology innovation in the Yangtze River Economic Zone during the 12th Five-Year Plan period was significant, as the introduction of export manufacturing policies promoted the creation of a number of enterprises in related technology research and development and application areas, which led to the rapid development of green technology research and development and thus green technology progress (Ayre and Landis, 2012). However, with the implementation of the export manufacturing policy, especially after 2013, the export manufacturing policy is more focused on supporting the technological advancement of green production of enterprises in the industry, and has less effect on the technological advancement of enterprises in the regional industry.

In the second stage, from the perspective of industrial agglomeration, as the green manufacturing industry in the Yangtze River Economic Zone started late, the impact of the export manufacturing policy on the green production behaviour of enterprises within the regional industry was relatively weak. However, under the regional "dual carbon" objective, the export manufacturing policy of the Yangtze River Economic Zone has provided more support in encouraging local enterprises to participate in energy saving and emission reduction, environmental improvement and environmental management. The content of the hypothesis is found to have a positive impact and therefore H1-H2 are all valid.

Chapter 5 Conclusion and Recommendation

5.1 Conclusion

Adhering to the harmonious coexistence of man and nature is the basic strategy of socialism with Chinese characteristics in the new era (Al-Kake et al., 2019). The proposal of the "dual carbon" goal once again reflects the determination of the Party Central Committee. Relying on the golden waterway of the Yangtze River, the Yangtze River Economic Belt covers a wide area, has a large population, and has strong industries. Achieving high-quality and sustainable development is related to the future of the Chinese nation. This paper analyzes the current situation of the Yangtze River Economic Belt, and believes that the problems of ecological environment protection are still serious, the synergy between ecological construction and economic construction is not strong, the relationship between innovative resources and economic construction and ecological construction is significantly different, the gap between the three major plates of the Yangtze River Economic Belt is large, and the integration of the Yangtze River Economic Belt is low.

As this paper focuses on the impact of carbon emission reduction on the development of export manufacturing policy and economic quality development in the Yangtze River Economic Zone under the "dual carbon" target, the significance level of this result is also acceptable. Structural optimisation of export manufacturing policies and high quality economic development in the Yangtze River Economic Zone under the "dual carbon" target has suppressed carbon emissions to a greater extent than the quality of development of export manufacturing policies and high quality economic development in the YREC under the "dual carbon" target. The possible reason for this is that the overall improvement in the quality of development of the export manufacturing sector in the Yangtze River Economic Zone under the "dual carbon" target is a slow and gradual process compared to structural optimisation. It is easier to achieve carbon emission reduction through structural adjustment to green, low-carbon and clean production in the export manufacturing sector in the Yangtze River Economic Zone under the "dual carbon" target. Through the GMM robustness extension analysis, it can be seen that the "dual carbon" target has a significant effect on the improvement of the quality of development and the optimization of the industry structure of the export manufacturing policy and economic quality development level in the Yangtze River Economic Zone under the "dual carbon" target, and will fundamentally achieve the "dual carbon" target. The "dual carbon" target will have a significant effect on the improvement of the quality of development of the export manufacturing industry in the Yangtze River Economic Zone under the "dual carbon" target and the optimization of the industry structure, and will fundamentally achieve green, low-carbon and clean production in the export manufacturing industry policy and economic quality development level in the Yangtze River Economic Zone under the "dual carbon" target. It can be seen that the reduction of carbon emissions under the "dual carbon" target can contribute to the improvement of the quality of development of the export

manufacturing policy and the level of economic quality development in the Yangtze River Economic Zone under the “dual carbon” target. Therefore, we should give full play to the fundamental driving force of green innovation in high-quality development, strengthen the coordination and cooperation mechanism between top level design and unblocked subjects, open innovation resources to build a science and technology sharing platform, rely on transportation advantages to improve the flow intensity of production factors, and innovate diversified investment and financing mechanisms to ensure the effective implementation of innovation drive and inter provincial coordination.

5.2 Recommendation

5.2.1 Give play to the role of innovation as the source power in ecological, economic and social development

Innovation is the fundamental power to promote industrial transformation and upgrading. All provinces and cities in the Yangtze River Economic Belt should attach great importance to investment in innovation funds and talent development, give play to the core role of central cities (downstream central cities include Shanghai, Nanjing, Hangzhou and Hefei, midstream central cities include Wuhan, Changsha and Nanchang, and upstream central cities include Chongqing, Chengdu, Kunming and Guiyang), establish a collaborative innovation mechanism with enterprises as the main body and an organic combination of industry, education, research and use, and improve papers, patents Output efficiency of standard and other innovative achievements. The government encourages innovation entities to jointly build R&D platforms, establish technological innovation alliances, form a long-term and stable community and a number of joint fleets leading industrial technological innovation through complementary advantages and collaborative innovation, break through technological bottlenecks and institutional constraints of industrial development, and enhance the independent innovation capability of the Yangtze River Economic Belt.

Attach importance to the green orientation of innovation. On the one hand, we should pay close attention to the technological innovation of traditional industries, especially the transformation and upgrading of high energy consumption and high pollution industries, so as to realize the greening and cleaning of traditional industries; On the other hand, aiming at emerging industries, facing the world's leading edge of science and technology, the main battlefield of the economy, major national needs, and the health of people's lives, we will strive to make a number of new products, new enterprises, and new industries bigger and stronger.

5.2.2 Strengthen top-level design and unblock the cooperation mechanism between subjects

Different administrative bodies such as provinces, counties and cities are involved along the Yangtze River Economic Belt. Without orderly guidance, control and preferential policies at the national level, disorderly competition and games will inevitably occur in the development process, forming internal friction (Burgess &

Paguio, 2016). Therefore, it is necessary for the healthy and orderly development of the Yangtze River Economic Belt to achieve overall coordination.

First, improve the regional intergovernmental coordination mechanism. In order to build the Yangtze River Economic Belt and promote the coordinated development of the region, we should promote it at a high level, establish an inter provincial joint meeting system within the economic belt, hold regular meetings every year, conduct collective consultations with major issues that need to be solved in cooperation, and make unified arrangements for implementation. Study and formulate special cooperation plans and implementation plans, and supervise their implementation.

Second,improve the coordination mechanism of regional ecological construction. According to the Yangtze River Protection Law, local governments should formulate objectives and measures for ecological environment protection and carry out regional cooperation. First of all, provinces and cities should strengthen information sharing, expand experience sharing platforms, and improve the efficiency of ecological environment restoration and construction; Secondly, provinces and cities should break through the boundary thinking of ecological environment construction administrative regions, have the overall and overall awareness, act together, and adopt the overall optimal solution.

Third, improve the coordination mechanism of regional economic development. To formulate a long-term and pragmatic local policy system and carry out regional economic cooperation, it is necessary to gradually revise and unify the regional laws and regulations of each member unit, such as the fiscal and taxation system, land system, talent system, social security system, etc., and revise and coordinate the regional policies and regulations that conflict with the overall planning. On this basis, we will discuss the establishment of laws and regulations conducive to regional economic cooperation, integrate and formulate reasonable regional development policies, including fiscal policies, financial policies, industrial policies, etc., overcome the tendency of multiple governments to act independently, guide the rational distribution of productive forces, achieve regional division of labor and rational use of resources, and prevent industrial isomorphism and duplication of infrastructure construction. In addition, we should improve market supervision, establish fair, open and transparent market rules, and, on the premise of formulating a negative list, let all types of market entities enter the fields outside the list equally according to law, so as to stimulate the vitality of market entities.

Fourth, encourage the establishment of a number of regional intermediary organizations. In addition to the role of government, non-governmental organizations such as social intermediary organizations and enterprises should also play a role in regional cooperation, and a regional development consultation and coordination mechanism led by the government coordination and cooperation mechanism should be established with multi-level participation. First, develop various research and consulting intermediary organizations, including the establishment of the Yangtze River Economic Belt Advisory Committee with experts and scholars as the main body, to provide advice on major plans and issues; Secondly, to develop cross regional industry associations, we can consider the industries involved in most areas of the

Yangtze River Economic Belt, such as equipment manufacturing, electronic information industry, logistics, tourism, and establish regional industry associations.

5.2.3 Innovative and diversified investment and financing mechanism

Actively establish a diversified investment and financing mechanism dominated by financial funds and based on diversified market funds. The state, local governments, collectives and individuals jointly contribute to raise funds for the industrial development of the Yangtze River Economic Belt through multiple channels, at multiple levels and in multiple directions. Actively guide and encourage social funds to invest in the construction and development of the Yangtze River Economic Belt.

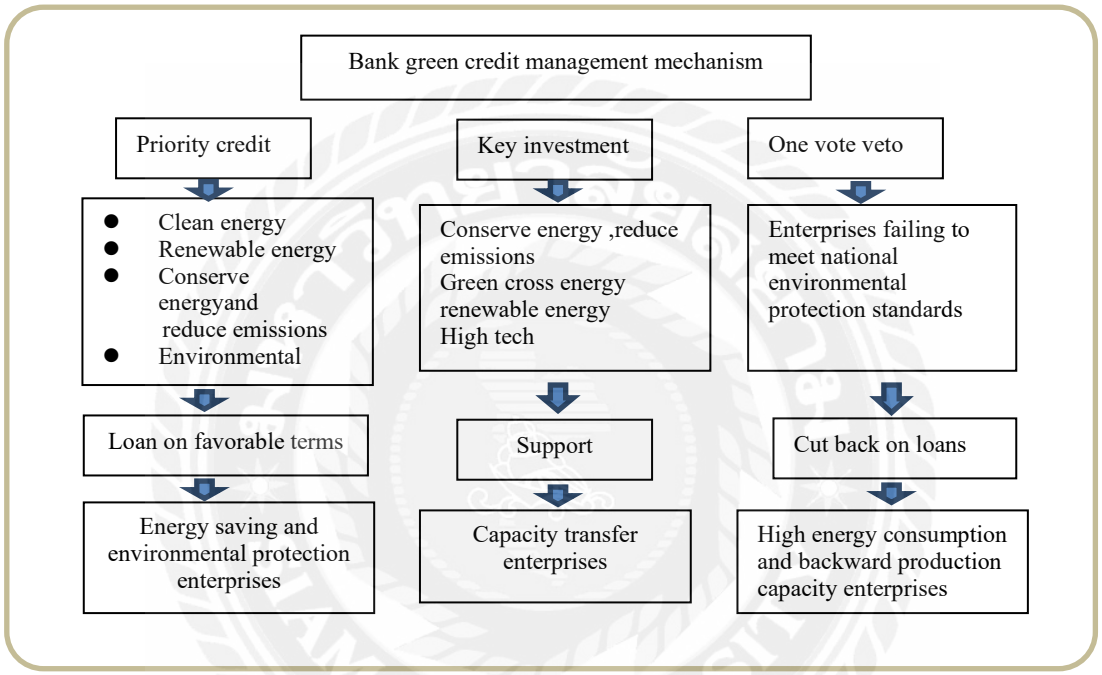

FIGURE5-6 Green credit model(Chen and Shen, 2021)

Government led banks need to establish a green credit management mechanism (Figure 5-6), open green credit approval through preferential loans, and support manufacturing enterprises to carry out energy-saving transformation of equipment and processes (Chen & Shen, 2021). First, take sustainable development and energy conservation and emission reduction as the precondition of credit, and give priority to the credit funds to enterprises and industries that upgrade energy conservation. The second is to provide more preferential loans to enterprises producing energy conservation and environmental protection, green energy enterprises, green transportation enterprises, renewable energy enterprises and strategic new enterprises. The third is to regularly assess whether the enterprises with loans implement green policies and measures, implement a hierarchical assessment mechanism and different management methods. Fourth, focus on the management and control of enterprises with high energy consumption and high pollution. Fifth, support the transfer of manufacturing industries to the "the Belt and Road", and guide manufacturing

enterprises to green transformation and high-quality development.

5.3 Further Study

In the future, relevant research can be promoted in the following aspects. First, select specific industrial chains to analyze the spatial layout of different links in the Yangtze River Economic Belt, and formulate planning measures for the coordinated development of inter provincial industrial chains; Second, analyze the difficulties and priorities of ecological construction of different industrial chains in the Yangtze River Economic Belt, determine the direction of innovation, and promote the integration of industrial development and ecological construction; Third, design the system of inter provincial coordination and cooperation in the Yangtze River Economic Belt, and give specific suggestions in terms of the scope of functions, division of responsibilities, distribution of interests, and coordination of relations.

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Appendix

Appendix A: A questionnaire survey

Dear school administrators,
Hello there! Thank you for taking time out of your busy schedule to complete this questionnaire. Please provide the most practical answers based on the actual questions mentioned. Thank you for your cooperation and help.

*1. Your gender:[single choice] *

○female

○male

*2. Your age:[single choice] *

○Under 20 years old

○20-40 years old

○40-60 years old

*3. Have you learned about the ecological environment protection knowledge in the Yangtze River Economic Belt region [single choice] *

○yes

○no

*4. Has the local government taken any action in ecological environment protection [single choice] *

○yes

○no

*5. Have you paid attention to the local industrial structure [single choice] *

○yes

○no

*6. Have local polluting enterprises exited [single choice] *

○yes

○no

*7. Is there a rise in green industries in the local area [single choice] *

○yes

○no

*8. Is there any change in the quality of the local ecological environment [single choice] *

○yes

○no

*9. Has the development of green economy improved local air quality [single choice] *

○yes

○no

*10. Has the development of green economy improved local water quality [single choice] *

○yes

○no

*11. Do you think it is beneficial to build the "Yangtze River Economic Belt"? [single choice] *

○have absence

○Not necessarily

○Not understanding

*12. Do you think the environment and economic development of the Yangtze River Economic Belt are coordinated? [single choice] *

○Not understanding

○coordinate

○Incoordination

○The two are not related

*13. [Economy] What challenges do you think the construction of the "Yangtze River Economic Belt" is currently facing? Multiple Choice Questions *

○The contradiction between industrial development and ecological protection

○The contradiction between marketization process and industrial homogeneity

○The Contradiction between Urbanization Expansion and Resource Dissipation

○Serious imbalance in development within and between regions

○Other

*14. [Economy] How do you think we should build the "Yangtze River Economic Belt"? Multiple Choice Questions *

○The concept should be advanced, adhere to ecological priority and green development, and prioritize ecological environment protection
○In terms of development strategy, it is necessary to prioritize the implementation of major ecological restoration projects to promote the development of the Yangtze River Economic Belt
○In terms of development ideas, it is necessary to strengthen Systems thinking, coordinate the reform and development of various regions, various interregional policies, construction in various fields, and various resource elements, and change the isolated development of independent management into the coordinated development of regional coordination
○Promote the maximization of efficiency and integration of development in the regions along the route, making the regional economy more balanced and sustainable
○In terms of development layout, it is necessary to optimize the layout of urban agglomerations in the Yangtze River Economic Belt, with different focuses, and adhere to the combination of large, small, and medium-sized, as well as the linkage between the East, West, and East
○Promote the division of labor and cooperation between and within urban agglomerations, promote the integration of industry and city, guide population agglomeration, and form an intensive, efficient, green, and low-carbon new urbanization development pattern

○Other

*15. Increase in return on equity of enterprises compared to the previous year [single choice] *

○No rise

○Slight increase in one of the three aspects of profitability, operational capability, and capital structure improvement

○Two of the three items have been improved

○One of the three items has undergone a qualitative change

○Significant increase in ROE, balanced and synchronized development of three abilities

*16. During the cooperation process between enterprises and other enterprises, they are often the dependent party [single choice] *

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

*17. The organizational form and value chain of the enterprise's partners are relatively rich [single choice] *

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

*18. The management of enterprises all agree on the strategic importance of service transformation [single choice] *

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

*19. The enterprise management actively promotes service-oriented activities

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

*20. Enterprises will regularly review the progress of service-oriented services with top teams based on their own positioning [single choice] *

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

*21. Enterprises will regularly evaluate the efficiency of service-oriented processes [single choice] *

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

*22. Enterprises will make continuous process adjustments and improvements based on the efficiency of service-oriented processes [single choice] *

○Very disagree

○Disagree

○Basically disagree

○Basic identification

○Strongly agree

Thank！

Appendix B :Data

Figure 1. Spatial pattern evolution of per capita disposable income of urban residents in the Yangtze River Economic Belt from 2000 to 2017.

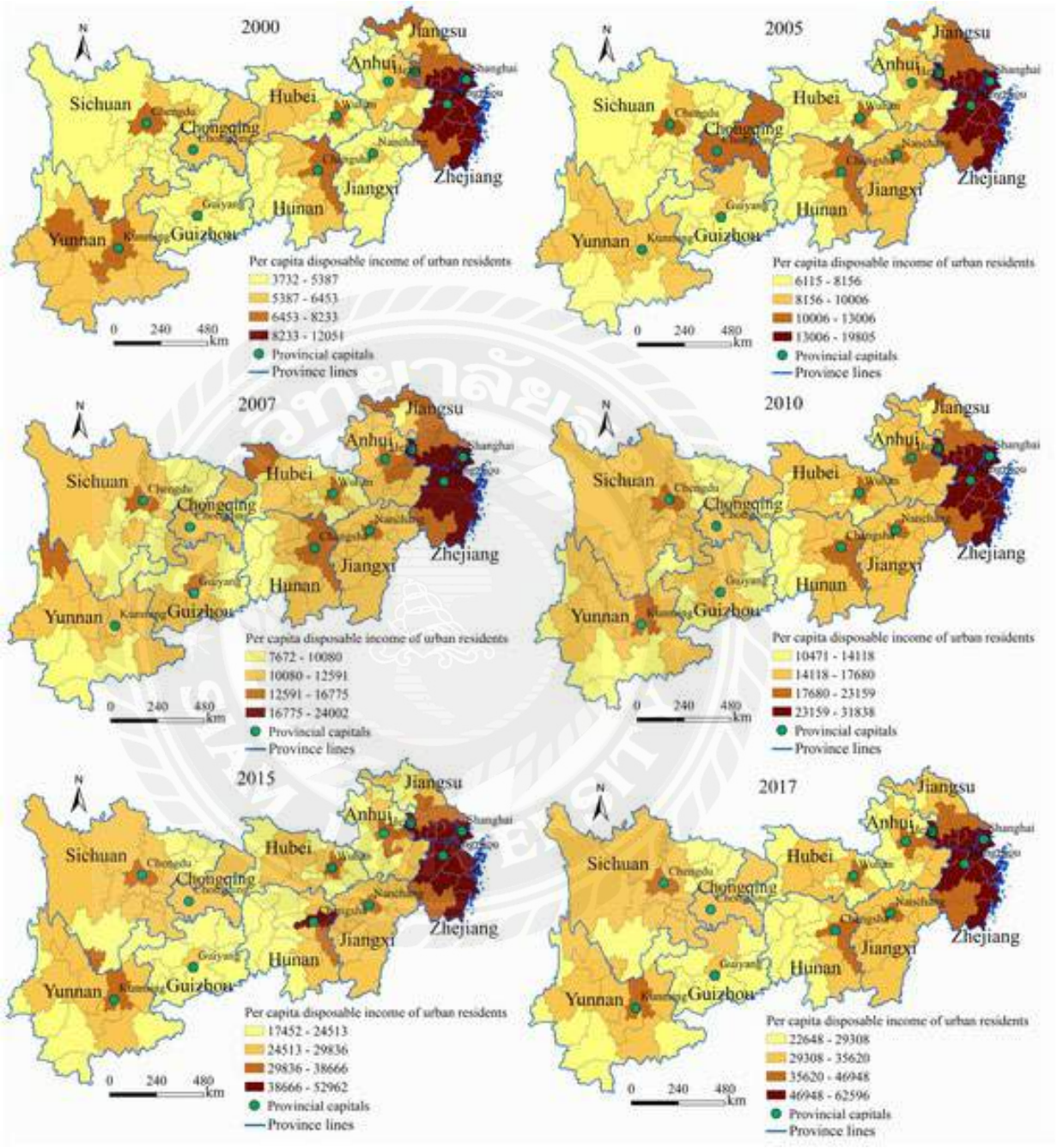


Figure 2. Spatial pattern evolution of the per capita disposable income of rural residents in the Yangtze River Economic Belt from 2000 to 2017.

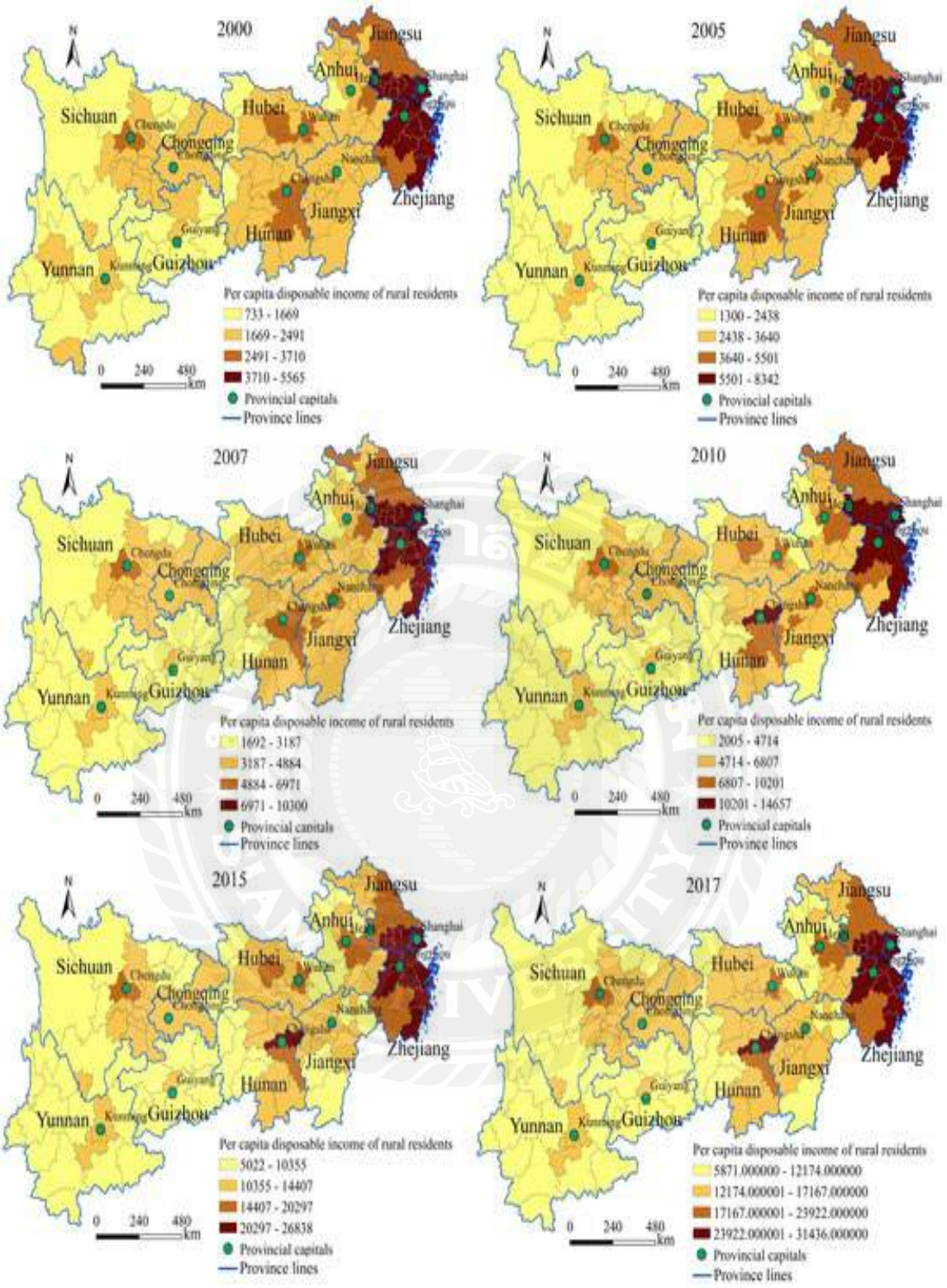
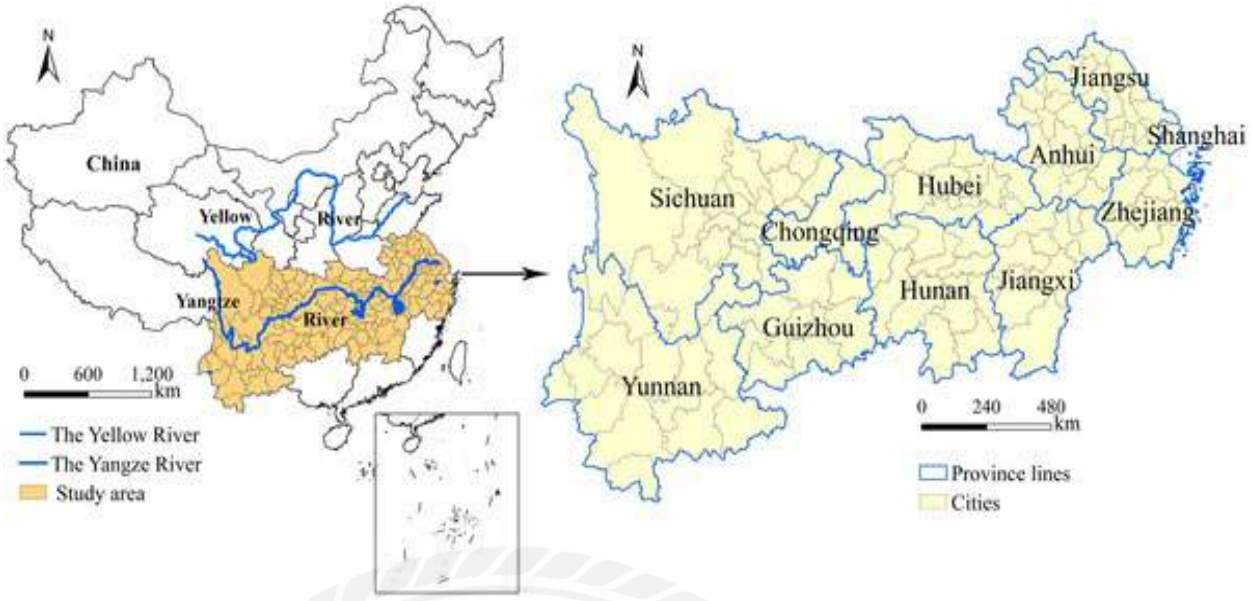


Figure 3. The location of the Yangtze River Economic Belt in China and an overview of the study area.



Overall, the TFP growth rate (*tfp*) in the overall region of Yangtze River Economic Belt from 2007 to 2018 showed a downward trend, which was basically consistent with the change trend of GDP growth rate during this period. From the characteristics of the calculated data, the overall growth rate of capital was getting higher and higher, while the growth rate of labor was getting lower and lower, and the TFP growth rate (*tfp*) was decreasing after calculation. Theoretically, with the continuous improvement of the economic development foundation of the provinces and cities along the Yangtze River, the TFP gradually increased, but the pulling effect of various factors on TFP continued to decrease, so the TFP growth rate (*tfp*) declined.

Table 2. The TFP growth rate (*tfp*) of the Yangtze River Economic Belt from overall region, upstream region, midstream region and downstream region from 2007 to 2018 (unit: %).

Year	Overall Region	Upstream Region	Midstream Region	Downstream Region
2007	10.86	11.95	12.66	9.54
2008	8.60	10.81	11.10	6.69
2009	8.07	8.48	9.96	7.08
2010	8.81	7.56	10.64	8.52
2011	6.41	8.02	8.37	5.06
2012	3.37	5.47	4.10	2.22
2013	3.08	3.03	2.76	3.26
2014	2.70	1.53	2.93	3.14
2015	1.79	0.46	1.58	2.48
2016	3.44	1.70	2.93	4.54
2017	0.74	0.83	-0.94	1.55
2018	0.83	−0.60	2.01	0.96

Data source: National Bureau of Statistics, statistical yearbooks of provinces and cities from 2007 to 2019. Note: The 11 provinces and cities in the Yangtze River Economic Belt are Shanghai, Jiangsu, Zhejiang, Anhui, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Guizhou and Chongqing. The downstream region includes Shanghai, Jiangsu, Zhejiang and Anhui. The midstream region includes Hubei, Hunan and Jiangxi. The upstream region includes Sichuan, Yunnan, Guizhou and Chongqing.

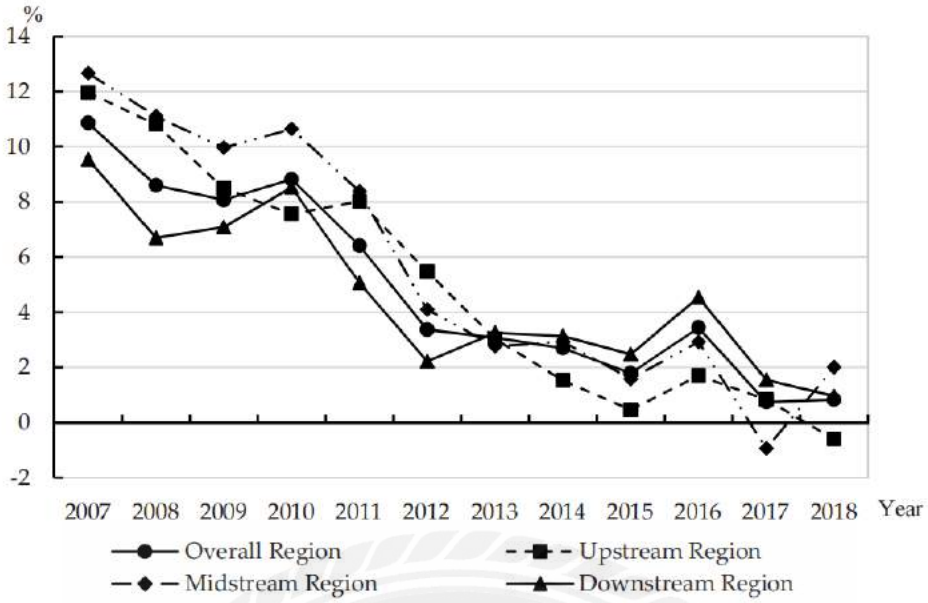


Figure 1. The TFP growth rate (*tfp*) of the Yangtze River Economic Belt from 2007 to 2018.

From a region perspective, from 2007 to 2018, the TFP growth rate (*tfp*) of the upstream region, midstream region and downstream region was consistent with that of the overall region and showed a gradually decreasing trend. Since the capital elasticity coeffificient α is uniformly 0.7 in this paper, the differences between regions have been reduced to a certain extent, and the actual differences should be larger. From the absolute value from 2007 to 2012, the TFP of the midstream region was the highest, followed by the upstream region, and that of the downstream region was the lowest. From the relative value from 2013 to 2017, the TFP growth rate (*tfp*) of the downstream region was the highest, followed by the midstream region, and that of the upstream region was the lowest. In 2018, the TFP growth rate (*tfp*) of the midstream region ranked fifirst, while that of the upstream region was negative. The difference between the upstream region, midstream region and downstream region shows a trend of first expanding and then narrowing.