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"Three-Circle Model" under the Green Development

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Abstract. In order to promote the new normal of green development and continuously meet the growing needs of the people, this paper builds a "three-circle model" of the green development indicator system: Green Wealth - Green Growth - Green Welfare. Green wealth mainly refers to the green development of the ecological environment. Green growth mainly refers to the level of green economy development, and green welfare mainly refers to the green indicators of society. This paper analyzes the symbiosis and interactivity of ecosystems, economic systems, and social systems from the whole to the local.

1. Introduction

Green development is one of the new development concepts of the 13th Five-Year Plan. The full text refers to "green" for 45 times and "green development" for 5 times. At the same time, the 19th National Congress of the Communist Party of China once again stressed the need to unswervingly implement the five development concepts of innovation, coordination, green, openness and sharing. The Yangtze River Delta region has played an important leading role in expanding the new space for regional development in China under the new normal and cultivating new impetus for environmental, economic and social green development. Therefore, establishing and improving the green development indicator system and evaluation method are an inevitable requirement for promoting green development in the Yangtze River Delta region.

Domestic and foreign scholars have focused on the green development index research on ecological environment. Rijisberman and Frans (2000) sets carrying capacity as a measure of urban water security assurance in the study of urban water resources assessment and management system [1]. Duogui Yang and Feipeng Gao（2006）constructed the National Green Development Index from four aspects for the first time: environmental metabolism, environmental benefits, greening of energy 'consumption' and environmental pollution of energy consumption [2].Since the first green development index report "2010 China Green Development Index Annual Report: Inter-provincial Comparison" was published in 2010, domestic research on the green development index has gradually become systematic. Xiaoxi Li and Jiancheng Pan（2011）as the editor-in-chief of the Green Development Index Report, introduced the background, significance, methods and ideas of the China Green Development Index. It points out that the preparation of the Green Development Index has important significance for promoting China's sustainable development. [3].Xu Xu（2014）started from the green development of resource-based cities, and from the aspect of the connotation, operational mechanism and mode of green development, to explore the establishment of a set of green development performance indicator system and evaluation mechanism in line with the characteristics of China's resource-based cities [4]. Yongjie Guo (2015）studied on the construction of Green

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Development Index of Ningxia County from the perspective of horizontal space differentiation [5]. Similarly, Shaohong Cai et al. (2017) also studied the green development level of 18 western provinces from the perspective of spatial differentiation [6]. Some scholars focued on the study of the economic development index：Leipert(1987) proposed that when measuring economic progress, it should carry out green national economic accounting, consider the negative impact of economic activities causing environmental pollution, and advocate subtracting the value of natural resource reserves consumed from the accounting of net investment. [7]. Rober Repetoo et al.（1989）proposed the Net Domestic Product (NDP), with a focus on the relationship between natural resource consumption and economic growth. Weibin lin and Bing Chen（2011）introduced the non-parametric linear programming method to construct the economic index of green growth in various regions, pointing out that there is a big difference in the level of green development between regions. [8]. While, some scholar focused on social aspects of green development index research：Angang Hu and Shaojie Zhou（2014）pointed that green development should emphasize the systemic, holistic and coordinated nature of economic, social and natural systems [9].Hong Tian and Chulin Pan（2015）used the theory of natural resources foundation, from the perspective of corporate ethics environment, to construct the relationship model between corporate environmental ethics, green intellectual capital and green innovation performance[10]. Jiaxing Liu（2016）divided the dimensions of green intellectual capital into green human capital, green structural capital, green relational capital and green innovative capital, and explained each dimension in detail, and then proposed the three functions of green intellectual capital, namely value creation and environmental protection and social care [11].

Table 1. Four-level index division of Green development index

Primary indicator	Secondary indicators	Three-level indicators	Four-level indicators
Green development index	Green wealth	Resource abundance	amount of water resources per capita, the proportion of wetland area to the area of national land, etc.
		Ecological protection indicators	forest coverage, the area of nature reserves occupying the proportion of the area under the jurisdiction
		Environmental pressures and climate change indicators.	per capita carbon dioxide emissions, per capita sulfur dioxide Emissions, carbon dioxide emissions per unit of land area, etc.
	Green growth	Green production	Waste recycling rate, total amount of industrial solid waste, etc.
		Green logistics	amount of nitrogen oxide emissions from road traffic, etc.
		Green consumption	disposable income per capita、growth rate of green consumption, etc.
	Green welfare	Green living index	urban per capita green area and urban sewage treatment rate, etc.
		Green government performance	environmental protection expenditure as a proportion of fiscal expenditure
		Green intellectual capital.	training expenditure per capita of green knowledge, etc.

2. Research design

The research objective of this paper is to establish a comprehensive, multi-level and operability indicator system for the green development index of the Yangtze River Delta region, and evaluate its green development and make recommendations to guide its establishment and improvement of the green development mechanism, and to promote the Green Yangtze River Delta development. The research objects are based on the whole provinces of the Yangtze River Delta, Shanghai, Jiangsu and Zhejiang, and then select some representative cities, such as Nanjing, Hangzhou, Suzhou and Changzhou.

The green development index system of the Yangtze River Delta region needs to be constructed from a multi-dimensional and multi-level perspective. As shown in the four-level indicator of the Green Development Index in Table 1, the "Green Wealth – Green Growth – Green Welfare" mechanism is established as the second-level division of the Green Development Index (the Green Development Index is set as the primary indicator).

(1) Green wealth**:** The resource potential carried by the environment is to measure the abundant potential of the region and the carrying capacity of the environment for future economic development, and it is the shared green wealth of mankind. Under the green wealth secondary indicators, it is subdivided into three indicators: resource abundance, ecological protection indicators, environmental pressures and climate change indicators. The abundance of resources may include the amount of water resources per capita, the proportion of wetland area to the area of national land, etc.; ecological protection indicators include forest coverage, the area of nature reserves occupying the proportion of the area under the jurisdiction; environmental pressure and climate change indicators include per capita carbon dioxide emissions, per capita sulfur dioxide Emissions, carbon dioxide emissions per unit of land area, etc.

(2) Green growth**:** Green growth is mostly measuring the level of green economy development. This project proposes a complete production and sales chain of production, transportation and consumption from the three links of "production-logistics-consumption". This topic needs to formulate the green growth indicators systems of total, structure and quality of each link. The gross indicator refers to the total amount of indicators in a certain link in the production chain, such as the total amount of industrial solid waste, the amount of nitrogen oxide emissions from road traffic, etc.; The structural indicator is the rate of change or the ratio of a certain indicator, expressed as a percentage, such as growth rate of green consumption, waste recycling rate, etc.; Quality indicators measure the size of a unit of resources or other factors in a certain segment, such as disposable income.

(3)Green welfare**:** This paper will measure green welfare from the perspectives of green living index, green government performance and green intellectual capital. The green living index includes urban per capita green area and urban sewage treatment rate; green government performance is the ratio of green input to output, such as environmental protection expenditure as a proportion of fiscal expenditure; green intellectual capital includes training expenditure per capita of green knowledge, etc. It proposes three major functions of green intellectual capital, namely value creation, environmental protection and social care.

2.1. Results analysis of Green Development Index in the Yangtze River Delta Region

(1) Consider the radiation effects of the government's green development policy. Since the government adopted the green development policy that has implemented good results when formulating the promotion of green development policies, the green development policy formulated by the government has the radiation effect of radiating to the surrounding.

(2) Sort the green development indices of each region. Analyze the characteristics of the green development level in the Yangtze River Delta region, and finally analyze the factors affecting the green development index of the Yangtze River Delta region according to the green development index of each region.

(3)Propose relevant feasibility suggestions according to local conditions. Through the comparison of relevant data, we can understand the advantages and disadvantages of each region in terms of green

development, and learn from the experience and lessons of other regions according to relevant policies, and finally find a green development model tailored to local conditions.

3. Conclusion

3.1. Theoretical significance

(1)The construction of the first demonstration zone of ecological civilization in the Yangtze River Delta region and the promotion of green development in the Yangtze River Delta region are the new concepts, new ideas and strategies for the Party Central Committee and the State Council to actively adapt to grasp and lead the new normal of green development. For China's development, the green development strategy is not an alternative strategy, but a development strategy that must be followed. It is the starting point for comprehensively promoting the five major constructions of economic construction, political construction, social construction, cultural construction and ecological construction. As the most promising region which has the fastest growing economy and the largest economic scale. It is very important and necessary to study research on green development in the Yangtze River Delta region

(2)There are significant regional differences in the factors affecting the green development of the Yangtze River Delta. The geographical environment and the implementation of government policies vary from region to region, requiring us to connect with the reality, advance with the times, and adapt to local conditions, which is of great significance for promoting the green development of the Yangtze River Delta.。

3.2. Practical significance

(1)A systematic understanding of the three dimensions of ecological, economic, and social development of the Yangtze River Delta region will help to comprehensively analyse and evaluate the status of green development in the Yangtze River Delta from different perspectives. This paper has constructed a "three-circle model" of green development - the mechanism analysis framework of "green wealth - green growth - green welfare", and analysed the symbiosis and interaction mechanism of natural systems, economic systems and social systems, among which, green Welfare is the goal of green growth, green wealth is the foundation of green welfare and green growth, and green growth is the means of accumulating green wealth and promoting green welfare.。

(2)Constructing a green development indicator model and evaluation system is conducive to formulating a rational green development strategy and promoting sustainable development in the Yangtze River Delta. The paper analyses and evaluates the green development of the Yangtze River Delta region by selecting appropriate and appropriate indices based on effective models.

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