Study on the Green Development Potential and International Cooperation Countermeasures of Primorsky Krai of Russia

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Abstract. Green development and international cooperation are important themes of today's social development research. As Russia’s important area to the Asia-Pacific region, the Primorsky Krai bears the responsibility of exploring international cooperation and green development methods. Based on the current situation of Russia's development, this study constructs an evaluation index system for green development capabilities from the four aspects. Based on the entropy method, the 2015 first-level administrative unit of the Russian Federation was evaluated for green development capabilities, focusing on the status quo of the green development capabilities of the Primorsky Territory and the development direction of international cooperation. The results show that the Primorsky Krai has a relatively high level of green development capability in the Russian Federation. The price level of the Primorsky Territory has the strongest impact on the green development capability, and the industrial green development capability urgently needs to be improved. According to the evaluation results, it put forward suggestions that the Primorsky Krai needs to improve the development of green international cooperation in terms of social development, etc., and provided theoretical support.

1. Introduction
Since the end of the 20th century, the contradictions between global environment and economic development have become increasingly prominent, and all countries are thinking about how to achieve a win-win situation in coordination. The Organization for Economic Cooperation and Development (OECD) proposed the concept of "green growth" and defined it as environmentally sustainable economic growth.

Research on green development at home and abroad started late, but the research progresses rapidly. In a nutshell, the relevant research is mainly carried out from two aspects: the conceptual analysis of green development and the research on energy evaluation. The origin of green development and the concept of "green economy" were put forward by the British economist Pierce [1]. The international organizations represented by the Organization for Economic Cooperation and Development (OECD) [2], the United Nations Environment Program (UNEP), and the Green Europe Foundation (GEF) have continuously improved the connotation of green development. The Chinese scholar Hu Angang constructed the "three-circle model" of green development [3].
The academic field has relatively rich research results on green development, and there is currently a lack of relevant research on the green development capacity of the Primorsky Krai of the Russian Federation. Russia is the world's largest country, with large regional differences [12]. The Primorsky Krai is Russia’s important area in the Asia-Pacific region. In the context of Russia’s "looking eastward" development, combined with the concept of green development, the Primorsky Krai will usher in new development opportunities.

Therefore, using the entropy method to evaluate the green development capacity of the Primorsky Krai in Russia, in order to explore the direction of green development of the Primorsky Krai, is conducive to the promotion of regional development and international cooperation. The important basis for the countermeasures will also have a certain reference value for the improvement of the overall green development capabilities of Northeast Asia.

2. Overview of Research Area
The Primorsky Krai is one of the first-level administrative units of the Russian Federation, and it is Russia's bridgehead to the countries in the Asia-Pacific region. It is located in the southern part of the Russian Far East, with the Sea of Japan to the south, Heilongjiang and Jilin Provinces in the west, and the Khabarovsk Krai to the north.

The Primorsky Krai is an important industrial base in the Russian Far East. It has the largest port in the Far East — Vostochny Port. The terrain is long and narrow from north to south, and the mountain area accounts for 80% of the territory. Russia is currently in the transitional stage of green development. The industrial development status of the Primorsky Krai and good natural resource conditions determine that the region must accelerate economic development while strengthening ecological construction to achieve a win-win situation between man and nature.

3. Methods and Data

3.1. Index system construction
Having drawn the lessons from the Organization for Economic Cooperation and Development (OECD) Comprehensive Green Growth Framework [2], the United Nations Environment Programme (UNEP) Green Measurement Index System [8], the results of the comprehensive measurement indicator system for green development in various countries [4–6], and other documents [9], establish the Russian green development capability evaluation index system, as shown in Table 1.

3.2. Methods
In order to make the green development capability evaluation system more objective and accurate, this article uses the entropy method in objective weighting to analyze the green development capability of the Primorsky Krai in Russia. The main steps are as follows:

(1) Constructing of the original index data matrix R, where i is the index, j denotes the evaluation sample; m shows the number of indicators, and n shows the number of evaluation samples. In this study, m=40 and n=83.
(2) Data processing refers to setting all indicators as positive or negative and their normalizing to eliminate the influence of dimensions between different indicators.

3.3. Data Sources
This study uses the 2015 Russian Federation statistical data, and the specific administrative divisions are based on 2015. Among them, the GDP per capita indicator (X1) data come from the "Russian Statistical Yearbook 2018", the economic level (X2~X9), public management construction (X10~X13), social development (X14~X32) and the index data of temperature (X33~X34) and precipitation (X33~X34) are all sourced from the "2016 Russian Statistical Yearbook", and the resource data come from the Russian Federal Bureau of Natural Resources Supervision and the Russian Federal Water Resources Agency.
| Target                      | Criterion                      | Index                                                                 | Unit                  | Indicator direction |
|-----------------------------|--------------------------------|----------------------------------------------------------------------|-----------------------|---------------------|
| Economic                   | Level of development           | X1 GDP per capita                                                    | Ruble                 | +                   |
|                             |                                | X2 Proportion of investment in fixed assets                          | %                     | +                   |
|                             |                                | X3 Price Consumption Index                                            | %                     | -                   |
|                             | development structure          | X4 Proportion of primary industry                                     | %                     | +                   |
|                             |                                | X5 Proportion of secondary industry                                  | %                     | +                   |
|                             |                                | X6 Proportion of tertiary industry                                    | %                     | +                   |
| Degree of extroversion      |                                | X7 Foreign exchange purchase                                          | mln rubles            | +                   |
| Income level                |                                | X8 Foreign exchange sale                                              | mln rubles            | +                   |
| Public management           | Number of people in the institutions | X10 Number of legislatures                                          | /                     | +                   |
|                             |                                | X11 Number of administrative agencies                                | /                     | +                   |
|                             |                                | X12 Number of Judiciary                                              | /                     | +                   |
| Society                     | Standard of living             | X13 Number of municipal institutions                                 | /                     | +                   |
| Research Education          |                                | X14 Population density                                               | /                     | -                   |
|                             |                                | X15 Natural population growth rate                                    | %                     | +                   |
|                             |                                | X16 Housing area per capita                                           | m²                    | +                   |
| Culture and Sports          |                                | X17 Proportion of low-income population                              | %                     | -                   |
|                             |                                | X18 Migration increment                                               | /                     | +                   |
|                             |                                | X19 Unemployment rate                                                | %                     | -                   |
| Medical opportunity        |                                | X20 Number of beds per 10,000 people                                 | /                     | +                   |
|                             |                                | X21 Number of doctors per 10,000                                     | /                     | +                   |
| Research Education          | Number of scientific researchers | X22 Number of scientific researchers                                | /                     | +                   |
|                             |                                | X23 Number of scientific research organizations                      | /                     | +                   |
| Infrastructure              | Economic construction engineering activities | X28 Economic construction engineering activities | mln rubles | + |
|                             | Number of research students    | X24 Number of research students                                       | /                     | +                   |
|                             | Educational institution        | X25 Educational institution                                           | /                     | +                   |
|                             | Cultural institution           | X26 Cultural institution                                              | /                     | +                   |
|                             | Sports organization            | X27 Sports organization                                              | /                     | +                   |
| Ecosystem                   | Temperature                   | X33 Average temperature in January                                   | ℃                     | +                   |
|                             |                                | X34 Average temperature in July                                       | ℃                     | -                   |
|                             | Precipitation                 | X35 Average precipitation in January                                 | mm                    | +                   |
|                             |                                | X36 Average precipitation in July                                     | mm                    | -                   |
|                             | Resource                      | X37 Fresh water consumption per unit output value                     | mln m³ / mln rubles   | -                   |
|                             |                                | X38 Woodland coverage                                                | %                     | +                   |
|                             |                                | X39 Air pollution emissions per unit output value                     | kt / mln rubles      | -                   |
|                             | Wastewater discharge per unit output value                            | X40 Wastewater discharge per unit output value                        | mln m³ / mln rubles   | -                   |
4. Research Result

Based on the above analysis, we provide strategic countermeasures for the development of China's financial industry under “The Belt and Road Initiative” Strategy.

4.1. Analysis of Green Development Capability of the Primorsky Krai

Let us calculate the scores of various indicators of the green development capacity of the Primorsky Krai and rank them. Judging from the scoring results, the price consumption index (0.05014) is particularly prominent in the score, and the price level has the strongest impact on the green development capacity of the Primorsky Krai. The next indicators with a score of about 0.01 are the number of legislatures (0.01662), forest land coverage (0.01406) and foreign exchange sales (0.00993), covering the three target-level indicators of public management construction, ecological environment and economic construction, respectively, indicating the coastal area The district's green development capacity building at these three levels has outstanding points, and the green development capacity building at the social development level needs to be strengthened. In addition, the social development index (X11−X32) score ranking is concentrated in the middle part, which is one of the factors affecting the green development capacity of the Primorsky Krai, which has a potential value for improvement in this regard. Finally, the proportion of the secondary industry (0.00056) scored the lowest, and the industrial green development capacity of the Primorsky Krai needs to be improved urgently. Efforts to promote the development of green industries are one of the key directions for enhancing the green development capacity of the region in the future.

![Figure 1. Index scores of the criteria layer of the Primorsky Krai.](image)

The level of the Green Development Capability Guidelines for the Primorsky Krai includes 14 indicators such as the level of economic development, the number of organizations, the standard of living, and resources. The two criterion-level indicators with the lowest scores are the number of government agencies (0.003) and precipitation (0.0024), indicating that the impact on green development capacity is small, or the Primorsky Krai needs to be improved in these two areas to enhance its green development capacity.

There are 4 target-level indicators, namely economic level (0.086), social development (0.0594), public management construction (0.0277), and ecological environment (0.0271). The green development capacity of the Primorsky Krai is the strongest in the economic level. The improvement of the inclusive green development capacity of the social green development area is necessary. The social
development indicators include all aspects of life, clothing, food, housing and transportation. The results show that the Primorsky Territory has a strong green development capacity in social development. The scores of public management construction and ecological environment are basically the same, indicating that these two contents should also be paid attention to in the evaluation of green development capability. Among them, public management construction indicators are often overlooked in the evaluation system, but they are inseparable from economic construction and even green development.

From the above analysis, it can be seen that the green development capacity of the Primorsky Krai is at the upper and middle levels of the Russian Federation. In order to further explore the direction of improving the green development capacity of the Primorsky Krai, this study will rank and weight the 40 indicators of the green development capacity of the Primorsky Territory. Set the scoring position (value) as the X-axis and the weight position as the Y-axis. The quadrant is divided into area I and area II by a straight line of Y=X. The indicator in area I represents the green development capacity of the Primorsky Territory. The advantage part, area II represents the part that needs to be improved, and the specific results are shown in Figure 3.

![Figure 2. The target-level indicator scores of the Primorsky Krai.](image)

4.2. **Countermeasures and methods of international cooperation to improve the green development capacity of the Primorsky Krai**

There are 24 indicators in Area I. These indicators are current superior indicators of the green development capacity of the Primorsky Krai, which have a positive impact on the green development capacity of the region. Therefore, it is necessary to explore higher-level green development roads while maintaining the current development status, so as to further promote the Primorsky Territory improvement of green development capabilities.

There are 15 indicators located in Area II. The proportion of the secondary industry, the average precipitation in January, the increase in migration, economic construction and engineering activities, and the number of scientific research organizations. The greater the difference between the ranking of scores and the ranking of weights, the greater the impact on the green development capacity of the Primorsky Krai, and the greater the need for improvement. Research development, economic, public management, social life and ecological environment indicators are all insufficient, the most notable are the number of scientific research organizations, economic construction activities and migration increments. The Primorsky Krai is sparsely populated, and it faces a serious brain drain problem, as well as the lack of economic construction and engineering activities, which severely restrict the improvement of the green development capacity of the Primorsky Territory. Therefore, the Primorsky Krai needs to pay attention to the cultivation of talents and establish the awareness of green development in order to do a good job in the construction of green development capabilities.
Figure 3. Schematic diagram of the ranking of weights and scores of the Primorsky Krai.

The difference between the scoring rank (numerical value) and the weight rank (numerical value) of each indicator of the green development capacity of the Primorsky Krai is shown in Figure 4. The final result of the economic level and ecological environment indicators is negative, indicating that these two indicators have played a positive role in the green development capacity building of the Primorsky Krai as a whole. The final result of the public management construction and social development indicators is positive, indicating that the Primorsky Krai needs to focus on the construction of regional green development in these two aspects, so as to enhance the regional green development capacity.

5. Conclusion and Discussion

5.1. Conclusion
The research draws the following conclusions:
(1) The entropy method of weighting has found that the degree of scientific research, education and economic outwardness determines the important factors of the Russian Federation’s green development capacity; the resource indicators play an important role in the green development capacity of green development regions; the public management construction indicators are indicators that are ignored in other indicator systems, but its position in the construction of the green development capacity cannot be ignored.

Figure 4. The difference between the scores and weights of various indicators.
(2) The green development capacity of the Primorsky Krai was ranked 20th among 83 first-level administrative units of the Russian Federation in 2015, and the overall green development capacity was relatively high. The price level of the Primorsky Territory has the strongest impact on the green development capacity, and the indicators of social life have performed well. The industrial green development capacity needs to be improved urgently. As a key deployment area for the Far East development, it has strong green development potential.

(3) The Primorsky Krai needs to improve its green development capabilities in terms of public management construction and social development. Therefore, the Primorsky Krai needs to pay attention to personnel training when formulating countermeasures for international cooperation, and establish a sense of green development cooperation, in order to do a good job in the construction of green development capabilities.

5.2. Discussion
The Primorsky Krai is an important administrative unit in the border areas of the Russian Federation. It has particularities in terms of economic and public management resources. This indicator system is based on the development of entire Russia. On this basis, you can try to build specialized indicators based on the internal conditions of the Primorsky Krai. In addition, the dynamic monitoring of the green development capacity of the Primorsky Territory is also a future research direction, which can explore the law of green development and predict the direction of green development.

Under the current social background, the green development strategy is an important direction for economic and social development of the Primorsky Krai and even the Russian Federation. Green development should be taken as the basic criterion for promoting economic, public management, social and ecological environment construction. Relying on scientific and technological and institutional innovation to achieve green growth in economic construction, strengthening the green development awareness of governments at all levels in public management construction, vigorously promoting investment in human capital in social construction, and promoting ecological investment in ecological construction to enhance green welfare.

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