



Trends and factors of green regional economy development: theoretical-research aspect

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Abstract. With the deepening of industrialization, modernization and urbanization, global environmental and resource problems are becoming more and more serious, and the development of a green economy is becoming an important global trend that is also reflected at the regional level. The *goal* of the study is to analyze the key factors determining green economic trends and to attempt to determine the future directions of these trends themselves. The *methodological* basis of the study was formed by analytical and comparative methods, as well as relevant works of scientists devoted to the study of trends and factors of green economy development, primarily in the regional context. The *results* of the analysis show that, firstly, the connotation of the essence of the green economy is constantly evolving and becoming broader. The Sustainable Development Goals perspective emphasizes that a green economy is a low-carbon, environmentally friendly and sustainable model of the dynamic trajectory. Secondly, the system of relevant tools for assessing and indicating the trends of the green economy is becoming increasingly multidimensional in terms of reflecting the parametric characteristics of environmentally oriented development of the regional economy. Thirdly, there is a gradual transformation in the methods of researching the factors of impact on the green economy development, expressed in the transition from unilinear causal analysis to multidimensional non-linear network one, covering not only explicit but also implicit factors. It is shown that future research in this area will be increasingly interdisciplinary, practically orientated towards the development of regional green policies.

Keywords: green regional economy, factors, development trends, theoretical-research aspect

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Тренды и факторы развития зеленой экономики региона: теоретико-исследовательский аспект

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Аннотация. С углублением индустриализации, модернизации и урбанизации глобальные экологические и ресурсные проблемы становятся все более серьезными, и развитие зеленой экономики становится значимой мировой тенденцией, находящей отражение и на региональном уровне.

Цель исследования – анализ ключевых факторов, детерминирующих «зеленые» экономические тренды, а также попытка определить будущие направления самих этих трендов. *Методологическую* основу исследования составили аналитический и компаративный методы, а также актуальные труды ученых, посвященные изучению трендов и факторов развития зеленой экономики, прежде всего, в региональном разрезе. Результаты анализа показывают, что, во-первых, коннотация сущности «зеленой» экономики постоянно эволюционирует и становится все более широкой. В ракурсе достижения целей устойчивого развития подчеркивается, что «зеленая» экономика – это низкоуглеродная, экологически чистая и устойчивая модель динамической траектории. Во-вторых, система актуальных инструментов оценки и индикации трендов зеленой экономики становится все более многоаспектной в ракурсе отражения параметрических характеристик экологически ориентированного развития региональной экономики. В-третьих, наблюдается постепенная трансформация методов исследования факторов воздействия на развитие зеленой экономики, выражаясь в переходе от однолинейного причинно-следственного анализа к многомерному нелинейному сетевому анализу, охватывающему не только явные, но и неявные факторы. Показано, что будущие исследования данной сферы будут все более междисциплинарными, практически-ориентированными на выработку региональной «зеленой» политики.

Ключевые слова: зеленая экономика региона, факторы развития, тренды развития, теоретико-исследовательский аспект

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The connotation and extension of green economy

Since the beginning of the 21st century, the world has witnessed various crises brought about by the development of the «black» economy. Against the backdrop of increasingly depleted resources and weakened environmental carrying capacity, the world, especially developing countries, is forced to re-examine the relationship between economic growth and resource environment. In the context of global high emphasis on sustainable development, advocating the concept of low energy consumption and high efficiency green economy has become a research hotspot in the current economic field. The understanding of its essence and connotation is gradually deepening and presenting knowledge innovation.

As a cutting-edge economic concept widely involved in society, green economy has multiple understandings at various levels, regions, and times, partly due to its theoretical ambiguity. Therefore, tracking the research trajectory of green economy and summarizing relevant research progress have important academic value and practical significance for us to clarify the connotation of green economy, establish a scientific theory and methodology system of green economy, formulate green economy strategies and policies, and achieve the transformation and application research of green economy.

This article aims to analyze the connotation of green economy and related hot topic research, providing more possibilities for in-depth exploration of green economy research.

As early as the 1970s and 1980s, international organizations proposed sustainable development strategies. To promote the implementation of sustainable economic development on a global scale, a series of sustainable development paradigms have been proposed in both theoretical and practical fields. Among them, green economy advocates achieving coordinated development of economy, society, and environment, which is a key way for developing countries to move towards prosperity and prosperity [1–3]. The concept of green economy was first proposed by British environmental economist Pearce in his work "Green Economy Blueprint" in 1989 [4]. The core idea is that economic development should be within the range of natural environment and human affordability, and build a sustainable economy. "Green" does not only refer to the color in people's traditional cognition, but more symbolizes vitality and vigor.

The green economy is proposed relative to the "black" economy that traditional industry damages the ecological environment. The term "early green economy" was often used by environmental economists, highlighting the ecological attributes of the development goals of green economy. In 2007, the United Nations Environment Programme (UNEP) defined the green economy as an economic form that emphasizes harmonious coexistence between humans and nature, and can create decent and high paying employment.[5] The proposal of this concept marks the transformation of the development goal of green economy from a single ecological benefit to an ecological economic benefit, which has led to a series of emerging concepts such as green new policies, green investment, and green growth. During this period, research on green economy gradually expanded to the practical field of national economic system transformation. The United States, Europe, Japan, and others have also successively introduced green policies, providing rich practical materials for the evolution of the connotation of green economy.

In a report released by the UNEP in 2011, the definition of a green economy was further revised to «an economic development model that greatly reduces environmental damage and ecological scarcity while improving human well-being and social equity» [6].

Compared to the previous period, the significant change in this concept lies in its emphasis on the social dimension of green economy, which includes social progress such as improving social welfare, improving social quality, and promoting social development [7]. Afterwards, relevant research no longer only focused on ecological governance and economic benefits, but also incorporated the three dimensions of ecology, economy, and society into a unified framework to jointly explore future economic development goals [8]. The International Green Economy Association defines green economy as an economic development model aimed at achieving economic development, social progress, and environmental protection, based on low-carbon, green, and circular development of industrial economy, and expressed in the form of sustainable development proportional to resource conservation, environmental friendliness, and economic growth. The goal is to improve human welfare and guide the transformation of human society from "industrial civilization" to "ecological civilization". This concept highlights the comprehensiveness and complexity of the green economy system.

To this day, the connotation and related theories of green economy are still under continuous exploration and improvement. With the passage of time and the logical development of human understanding of the relationship between environment and economy, the understanding of the development goals of green economy around the world has gradually shifted from a single development perspective to a comprehensive development perspective, and the scope of defining green economy has also continued to expand [9].

Methodology for analyzing trends and factors of green regional economy development

The aim of the analysis is to systematize methodological approaches to the factors and trends in the development of green economy of regional systems studying. The achievement of this goal was carried out on the methodological basis of the innovative cyclic paradigm of environmentally sustainable development, focused on improving the quality of the environment and effective-fair achievement of strategic (long-term) economic goals [10]. In addition, an important place in the methodology was taken by analytical and comparative methods, which allow us to form a complex interrelation of parameters characterizing the factors of green economy development in the region.

Results of analyzes of trends and factors of green regional economy development

The evaluation of green economic development is a quantitative expression of the connotation of green economy and an important means of measuring the level of green economic development. The development path of evaluation research is closely related to the enrichment of the connotation of green economy. At present, research on the evaluation of green economy development can be mainly divided into two research paradigms: single indicator evaluation and comprehensive system evaluation. Single indicator evaluation mainly focuses on a specific aspect of green economic development, such as energy consumption, environmental pollution, economic benefits, etc. Common single indicators include energy intensity, environmental pollution index, green GDP, carbon productivity, etc. These indicators can to some extent reflect the development level of green economy, but they are difficult to fully reflect the connotation of green economy. For example, a low energy intensity can indicate the development of a green economy, but focusing solely on energy consumption cannot comprehensively evaluate the development of a green economy. Therefore, the single indicator evaluation method has limitations in practical application.

The comprehensive system evaluation uses multiple indicators to comprehensively evaluate the development of green economy. This type of method comprehensively considers multiple dimensions of green economy, including ecology, economy, and society, and has a high degree of comprehensiveness in evaluation [11]. Common comprehensive evaluation systems include the United Nations Human Development Index (HDI), the United Nations Environment Programme's Green Economy Progress Index, the Global Green Growth Association's Global Green Growth Index, and China's Green Development Index. The Human Development Index takes into account factors such as lifespan, education, and living standards; The United Nations Environment Programme has established a green economy measurement framework from three dimensions: environmental issues, policy interventions, economic and social benefits, and human well-being; The Global Green Growth Index includes four aspects: green investment, green trade, green employment, and green innovation; The Green Development Index focuses on multiple aspects such as resource utilization, environmental pollution, and ecological damage. These comprehensive evaluation systems can better reflect the comprehensive development level of the green economy.

A large amount of research has been conducted internationally on the evaluation of green economy. Due to differences in research objectives, perspectives, and methods, different institutions and scholars have different choices of indicators for evaluating the development of green economy. However, the core concept and goals of green economy are still clear. Future evaluation research on green economy development will continue to focus on various aspects of environment, economy, and society, making more contributions to governments and enterprises in various countries to better promote green economy development and achieve sustainable development goals.

The study of the influencing factors of green economy is the exploration of various constraints and factors that promote the development of green economy, which can be analyzed from both macro and micro levels. At the macro level, it mainly includes the international political and economic situation, national policies, regional development patterns, etc. [12]. At the micro level, it includes corporate environmental awareness, technological innovation, market mechanisms, and so on. In addition, the development of green economy is also influenced by various factors such as social culture, ecological environment, and population structure.

There are currently two main research paradigms for empirical research on the factors influencing the development of green economy. One is to construct an econometric regression model to analyze the influencing factors of green economy. The second is to construct a mathematical model that incorporates the influencing factors of green economic growth into the economic growth framework. M. Noura et al.'s research explored the bidirectional causal relationship between green economy, finance, and clean technology variables [13]. The research results show that the realization of global low-carbon economic transformation needs to be coordinated with the application of clean technologies in the production process and the continuous digitization of the financial sector. The government's promotion of clean technology production and the growing interest of investors in fintech will all contribute to the growth of green economy.

R.U. Danish focused on the impact of environmental technology on green economy in BRICS economies, and found that environmentally related technologies have a positive contribution to green growth [14]. L. Jialin explored the influencing factors of China's green economy development by constructing a dynamic panel data model, and found that energy structure, industrial structure, technological innovation, and policy support have a significant promoting effect on the development of green economy [15]. L. Lijuan, C. Wei and X. Lingge analyzed the influencing factors of green economic development from the perspective of regional differences, and believed that the level of regional green economic development is constrained by various factors such as geographical environment, economic development level, industrial structure, and technological level [16].

The study of factors influencing the development of green economy is a systematic and comprehensive task, and its research methods have gradually shifted from single linear causal analysis to multivariate nonlinear network analysis, focusing not only on explicit factors but also on implicit factors. However, existing research has focused more on its direct impact, while the exploration of its impact mechanism is relatively insufficient. At the same time, in terms of heterogeneity testing, the research perspective is also relatively single, usually limited to conventional regional heterogeneity analysis. In order to comprehensively explore these influencing factors, future research needs to delve deeper into the correlation mechanisms between them. In addition, we can also conduct heterogeneity tests from different aspects such as differences in energy consumption intensity and levels of green economy, and discover the differentiated challenges faced by different regions in promoting green development, providing targeted recommendations for policy makers.

Discussion

Green economy is an economic model that focuses on sustainable development, emphasizes environmental protection, resource conservation, and ecological balance. This model not only focuses on economic benefits, but also emphasizes social and environmental benefits, committed to achieving harmonious coexistence between humans and nature. Through a research review of the connotation, evaluation methods, and influencing factors of green economy, this article aims to provide theoretical support and practical reference for research on the development of green economy.

The current green economy covers multiple fields such as green industry, green technology, and green consumption, comprehensively penetrating all aspects of economic activities such as production, distribution, exchange, and consumption. This also provides a large number of hot topics for the research of green economy, which not only involve theoretical innovation, but also need to solve practical problems. For example, the green economic growth model requires us to transform traditional development concepts and explore growth methods that meet the requirements of sustainable development. Green industry policies need to formulate policy measures that are conducive to environmental protection and resource conservation, and promote industrial transformation and upgrading; Green technology innovation means developing technologies with energy-saving and emission reduction effects to reduce environmental pollution in the production process. Green consumption encourages people to purchase environmentally friendly and low-carbon products to improve their quality of life. The green economy evaluation system requires the establishment of an indicator system that can comprehensively reflect the level of green economy development, in order to better monitor and evaluate the status of green economy development.

Conclusion

The global development trend of green economy indicates that governments and enterprises around the world are increasingly valuing the transformation of green economy, actively formulating relevant strategies and policies, and promoting the development of green economy. In this process, theoretical research and practical exploration promote each other, constantly enriching and developing green economy theory. Interdisciplinary research methods also provide new perspectives and ideas for green economy research, such as ecological economics, environmental economics, energy economics, etc. These interdisciplinary studies provide rich theoretical resources and methodological support for green economy research [17].

In short, green economy, as an emerging economic concept, is gradually gaining widespread attention and application worldwide. Faced with the challenges brought about by resource depletion and environmental degradation, we must deeply study the connotation and laws of green economy, actively explore the development mode of green economy, and promote the transformation of green economy. Through theoretical innovation and practical exploration, we are expected to achieve harmonious development between economic growth and resource environment, creating a green, harmonious, and sustainable future for humanity.

In future research, we should focus on the following aspects: firstly, continue to deepen the theoretical research of green economy, clarify the connotation and laws of green economy development. Secondly, pay attention to the process of formulating and implementing green economy policies, study policy effects and optimization plans. Thirdly, strengthen the research on the evaluation system of green economy and provide scientific basis for policy formulation. The fourth is to conduct interdisciplinary research, draw on research results from other fields, and provide new theoretical resources and methodological support for the green economy. The fifth is to strengthen international cooperation, jointly address global environmental issues, and promote the development of global green economy. Through these efforts, we believe that the concept of green economy will better serve the sustainable development of human society and contribute wisdom and strength to building a better home.

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