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China's Characteristic Pathway to Sustainable Development: Logic, Practice, and Global Implications

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ABSTRACT

Industrialization has boosted productivity and transformed wealth accumulation, but has also caused resource depletion, pollution, and ecological imbalances. Against this backdrop, sustainable development has evolved from an environmental concern into a global principle, as marked by milestones from the 1972 Stockholm Conference and the 1992 Rio Summit to the 2015 UN 2030 Agenda, through which the international community has reinforced the consensus that development must respect ecological carrying capacity and intergenerational equity. China, however, has not followed the "grow first, clean up later" model. Instead, given its vast population, pronounced regional disparities, and complex developmental stages, it has forged a distinctive institution-driven pathway anchored in three pillars: state-level coordination that translates green targets into enforceable governance; strategic integration of carbon neutrality goals with industrial upgrading and energy restructuring; and a people-oriented approach that links ecological governance to improved livelihoods. This paper examines this pathway from three dimensions—global evolution, China's institutional practices, and worldwide implications—to demonstrate its practical necessity and international relevance. It argues that despite challenges such as regional imbalances, China's experience offers valuable insights for developing countries navigating trade-offs between growth, resource limits, and environmental stewardship.

KEYWORDS

Sustainable development, China's pathway, Green transition, Institutional innovation, Developing countries

1. INTRODUCTION

Industrialization has dramatically boosted productivity and reshaped the accumulation of social wealth, but it has simultaneously engendered resource depletion, pollution accumulation, and ecological imbalances. Against this backdrop, sustainable development has gradually ascended from a purely environmental issue to a shared global development principle. From the 1972 Stockholm Conference and the 1992 Rio Summit to the 2015 United Nations 2030 Agenda for Sustainable Development, the international community has continually reinforced the consensus that development must accommodate ecological carrying capacity and intergenerational equity [1]. The enduring significance of sustainable development lies in its attempt to answer a practical question: how should a nation reorganize the relationships among its economy, society, and environment under the concurrent pressures of population growth, consumption expansion, and finite resources?

China's exploration has not followed the conventional "grow first, clean up later" trajectory of Western industrialized economies. Instead, it has synchronized economic and urban development with environmental governance, resource management, and livelihood improvement. Given its

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enormous population, marked regional variations, and complex developmental stages, China has progressively forged a sustainability pathway characterized by state-level coordination, green transition as a strategic direction, and tangible improvements in people's well-being. Hu Angang systematically articulated this distinctive Chinese approach, which diverges from the Western model [2].

This paper examines this pathway from three interconnected dimensions—the global evolution of sustainable development, China's specific institutional and practical experience, and its broader worldwide implications—to demonstrate the practical necessity and international relevance of China's characteristic approach.

2. GLOBAL SUSTAINABLE DEVELOPMENT: EVOLUTION, OPPORTUNITIES, AND CHALLENGES

From an international perspective, the evolution of sustainable development has followed a trajectory of "concept proposal – institutional establishment – practical implementation." The 1987 Brundtland Report “Our Common Future” provided the classic definition, and subsequent UN conferences and frameworks have continuously urged nations to integrate ecological concerns into development policies. Conceptually, the international community has progressively recognized that environmental issues are not merely byproducts of economic growth but can, in turn, affect food security, public health, energy security, and social stability [1].

Currently, global green transition retains considerable momentum. Renewable energy costs continue to decline, with wind and solar photovoltaic expansion accelerating; digital technologies combined with circular economy models enhance resource efficiency; and the policy value of green finance, carbon sinks, and ecological restoration is rising. Multilateral cooperation and social participation are also strengthening. An increasing number of countries now view green industries, clean energy, and low-carbon technologies as critical arenas for new-round competition, indicating that green transition is not only an environmental imperative but also directly linked to industrial upgrading and international competitiveness.

Nevertheless, substantial obstacles remain. Fu Bojie and Zhang Junze point out that there is still a disconnect among scientific research, policy formulation, and social implementation, resulting in insufficient execution of the Sustainable Development Goals (SDGs) in many countries [1]. Moreover, climate change, biodiversity loss, geopolitical conflicts, and economic fragmentation interact, exacerbating disparities in technology, finance, and governance capacity. Some developed countries, under energy security pressures, have reactivated high-emission energy sources, illustrating that global green transition is not a linear progression but rather a continual negotiation between ideal targets and practical constraints. For many developing countries, the most acute challenge is not whether they endorse sustainable development, but rather their lack of the financial resources, technological know-how, and institutional capabilities required for a successful green transition—a persistent imbalance in global governance.

3. SUSTAINABLE DEVELOPMENT WITH CHINESE CHARACTERISTICS: CORE LOGIC, INSTITUTIONAL FRAMEWORK AND PRACTICAL APPLICATION

China's commitment to sustainable development is a strategic judgment grounded in its resource–environment constraints and modernization tasks. This choice is not a passive response but a proactive adjustment based on national conditions. Entering the new century, China has progressively integrated green development into its national strategy, elevating sustainable development from a

conceptual level to an institutionalized, project-driven phase, and forging closer links with high-quality development, regional coordination, and ecological civilization construction.

3.1. Core Logic: Consolidating Foundations across Three Dimensions

The essence of China's characteristic sustainable development lies in not opposing "development" and "protection," but rather in re-establishing their relationship within the modernization process. First, institutional coordination provides an organizational foundation. Through planning guidance, target decomposition, performance assessment, and cross-sectoral coordination, green development is embedded into local governance and industrial policies. Second, strategic anchoring supplies clear direction. Centered on the carbon peaking and carbon neutrality goals, green transition is integrated with technological innovation, energy restructuring, industrial upgrading, and rural revitalization. Third, a people-oriented approach enhances sustainability. Pollution control, rural environmental remediation, and public ecological space construction ultimately translate into improved quality of life and equitable benefits for residents. Precisely because green development responds to citizens' aspirations for a healthy environment and better living conditions, it enjoys stronger social support and reduces misconceptions that "environmental protection hinders development."

3.2. Institutional Architecture: Closed-Loop Promotion across the Entire Chain

In terms of governance structure, China has gradually established a closed-loop mechanism of "target setting – policy instruments – local implementation." At the top-level design stage, green and low-carbon requirements are incorporated into national development plans, with clearer timelines and responsibility allocations. In 2024, the Central Committee of the Communist Party of China and the State Council issued *Guidelines on Accelerating the Comprehensive Green Transformation of Economic and Social Development*, further refining the top-level framework for comprehensive green transition [3]. In terms of policy instruments, a relatively systematic "1+N" policy system has been formed around energy, industry, transportation, and ecological restoration, enhancing enforceability through standards, fiscal measures, markets, and performance reviews. At the grassroots level, local governments have advanced wind power, photovoltaic projects, energy-saving retrofits, and ecological engineering according to their specific conditions, while also leveraging green finance and carbon markets to improve resource allocation. Thus, China's sustainable development is not a mere slogan but is translated into actionable governance practices through institutional chains, with dynamic interaction between central coordination and local experimentation.

3.3. Practical Implementation: Landmark Projects Demonstrating Effectiveness

China's practice does not rely on a single project but embodies context-appropriate, differentiated implementation. The "Three-North" Shelterbelt Program has long improved windbreak, sand-fixation, soil conservation, and ecological security in northern China, demonstrating the continuity of large-scale ecological governance. The rural living environment renovation campaign, through waste collection and transport, toilet retrofitting, and water environment treatment, has improved rural living conditions, illustrating that sustainable development is not confined to macro-strategic levels but also permeates everyday grassroots governance. Projects such as "agriculture–photovoltaic complementarity" combine clean energy development with comprehensive land use, achieving synergistic ecological, economic, and social benefits. Concurrently, in advancing the "dual carbon" goals, different regions have designed differentiated pathways based on their resource endowments and industrial bases. Yang Hanwei et al., through case studies of typical domestic and international practices, revealed the diversity and adaptability of carbon peaking and neutrality pathways under varying conditions [4].

These cases demonstrate that China's characteristic sustainable development does not pursue a single environmental indicator but emphasizes multi-objective integration and adaptive implementation across diverse regional contexts.

4. GLOBAL SIGNIFICANCE AND FUTURE PROSPECTS

From an outcome perspective, China's characteristic sustainable development has transcended domestic policy practice to become a significant reference for global green transition. China's sustainability performance has steadily improved, and its urban spatial patterns are being optimized toward green, low-carbon, and high-quality development [5]. This indicates that the significance of China's experience is extending from domestic governance to international discourse.

Its global value is mainly reflected in three aspects. First, China has not fully replicated the traditional "pollute first, clean up later" path of industrialized nations, offering developing countries a realistic model for simultaneously advancing growth and governance. Second, China is progressively shifting from a rule-taker to a more active participant in global governance, supporting other countries' transition capacities through green infrastructure cooperation, technical exchanges, and experience-sharing. Third, China's experience demonstrates that long-term objectives, government coordination, market mechanisms, and people-oriented policies can form a relatively stable green transition framework, which holds considerable reference value for countries facing similar resource constraints and development pressures. In other words, the value of China's experience does not lie in simple replication, but in showing how latecomer countries can advance ecological governance alongside development and strike a relative balance between growth and limits.

Of course, China still faces challenges including regional development imbalances, high transition costs in traditional industries, and variations in local implementation. In the next phase, it should further enhance green technological innovation, improve mechanisms for realizing the value of ecological products, continue optimizing industrial and energy structures, and deepen international cooperation on climate governance, green finance, and ecological partnerships, thereby elevating its own sustainability performance through expanded openness and collaboration. At the same time, greater attention should be paid to the quality of policy implementation, avoiding formalism and superficial compliance in some localities.

5. CONCLUSION

Overall, global sustainable development has entered a phase centered on implementation. The difficulty no longer lies in the validity of the concept itself, but in whether durable, stable, and executable transition mechanisms can be established. China's exploration demonstrates that sustainable development is neither an ancillary patch to economic growth nor a trade-off that sacrifices development for environmental improvement, but rather a fundamental restructuring of the development model based on institutional coordination, strategic guidance, and people-oriented principles.

Hence, the significance of China's characteristic sustainable development lies both in addressing its domestic resource–environment constraints and high-quality development needs, and in offering an observable and comparable transition case for a broad range of developing countries. In the future, China needs to continue consolidating its green governance foundation domestically, deepen international cooperation and dialogue, foster a more stable balance among development, protection, and equity, and play a more constructive role in the global green transition.

REFERENCES

[1] Fu, B. J., & Zhang, J. Z. (2024). Progress and challenges of the sustainable development goals in China and globally. Bulletin of Chinese Academy of Sciences, 39(5), 804–808.

[2] Hu, A. G. (2012). China's characteristic pathway to sustainable development. Journal of Tsinghua University (Philosophy and Social Sciences), 27(4), 5–13.

[3] Central Committee of the Communist Party of China, & State Council. (2024). Guidelines on accelerating the comprehensive green transformation of economic and social development [EB/OL]. https://www.gov.cn/zhengce/202408/content_6967932.htm

[4] Yang, H. W., Chen, Q., Sun, L. D., et al. (2023). Action plans for carbon peaking and carbon neutrality: Typical cases and insights from domestic and international "dual carbon" pathways. Advances in Meteorological Science and Technology, 13(2), 73–79.

[5] Liu, X. D., Guo, D., Wang, J., et al. (2024). China sustainable development evaluation report (2024). Social Sciences Academic Press.