Theoretical Explorations, Strategic Innovations, and Path Selections for China' s Regional Coordinated Development During the 15th Five-Year Plan Period (Postprint)

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Abstract

Since the 18th National Congress of the Communist Party of China, through measures such as poverty alleviation, ecological civilization construction, and implementation of major regional strategies, China' s regional coordinated development has shown a positive trend. During the "15th Five-Year Plan" period, China' s regional coordinated development faces enormous challenges including global shortages in resource and environmental supply, sluggish consumption growth in China and the world' s major economies, multifaceted suppression by developed countries, and continuous catch-up by developing countries leveraging their low-cost advantages. The article first proposes new academic ideas such as the spatial development equilibrium theory, the source-sink spatial organization theory of flow-space economic network nodes, and the spatial convergence theory of innovation chains and industrial chains. Based on these theoretical innovations, it clarifies strategic priorities that emphasize both creating new drivers of development in developed regions and cultivating growth poles in underdeveloped regions, and that regional coordinated development should serve as a pathway for China' s modernization construction in the near term. The study argues that the main pathways for regional coordinated development should include: emphasizing the leading role of scientific and technological innovation in promoting regional coordinated development; building regional models of "scientific and technological innovation systems + new quality productive forces layout" according to local conditions; forming a new development pattern of comprehensive functional zones; advancing the westward shift of the center of gravity for resource-utilization-oriented industrial layout; and focusing on cultivating the growth pole functions of key areas. Finally, the article also discusses how to fully leverage the strategic and fundamental role of major function-oriented zones.

Full Text

Preamble

Regional coordinated development and territorial spatial optimization are issues of shared concern among government, academia, and society, representing one of the objectives for achieving Chinese-style modernization. *Bulletin of Chinese Academy of Sciences* has long focused on the positioning, optimization, and implementation of major function zoning. Researcher Fan Jie, a member of the editorial board of *Bulletin of Chinese Academy of Sciences*, and his team at the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, and the Institutes of Science and Development, Chinese Academy of Sciences, have long been dedicated to research on territorial function theory, the dual evaluation methods of resource and environmental carrying capacity and territorial spatial development suitability, regional sustainable development models, and modern spatial governance systems. During the research phases of the 13th and 14th Five-Year Plans, *Bulletin of Chinese Academy of Sciences* published special issues titled "Research on Regional Development Strategy of the 13th Five-Year Plan" (Issue 1, 2016) and "Regional Strategy and Spatial Governance of the 14th Five-Year Plan" (Issue 7, 2020), primarily based on the research findings of this team, which received positive feedback from various quarters. As the 15th Five-Year Plan period approaches, Researcher Fan Jie has led preliminary research to better formulate the *National Major Function Zoning Optimization and Implementation Plan*. The team has already produced a series of research outcomes in theoretical thinking and strategic innovation for regional coordinated development, approaches for optimizing major function zoning strategy to guide rational industrial layout, exploration of comprehensive functional zones to support new development patterns, and policy coordination to promote positive interaction between high-quality spatial security and high-quality spatial development. Based on this, this journal has organized the special issue "Regional Coordinated Development and Territorial Spatial Development Pattern Optimization in the 15th Five-Year Plan" to provide references for formulating the 15th Five-Year Plan and to serve as a think tank for China' s high-quality development during this period. This special issue was guided and advanced by Researcher Fan Jie, editorial board member of *Bulletin of Chinese Academy of Sciences*, Director of the Academic Committee of the Institutes of Science and Development, Chinese Academy of Sciences, member of the Academic Committee of the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, and Director of the Department of Human and Economic Geography at the University of Chinese Academy of Sciences.

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Theory, Strategy and Path of China's Regional Coordinated Development During the 15th Five-Year Plan Period

Abstract

Since the 18th National Congress of the Communist Party of China, China' s regional coordinated development has demonstrated a sound trend through measures such as poverty alleviation, ecological civilization construction, and the implementation of major regional strategies. During the 15th Five-Year Plan period, China' s regional coordinated development faces enormous challenges including global shortages in resource and environmental supply, sluggish consumption growth in China and major world economies, multi-faceted suppression by developed countries, and continuous catch-up by developing countries leveraging low-cost advantages. This article first proposes new academic ideas including the equilibrium theory of spatial development, the spatial organization theory of node source and sink in flow-space economic networks, and the spatial convergence theory of innovation chains and industrial chains. Based on theoretical innovation, it clarifies strategic priorities that give equal importance to creating new development drivers in developed regions and fostering growth poles in underdeveloped regions, while emphasizing that regional coordinated development should serve as a pathway for Chinese-style modernization in the near term. The study argues that scientific and technological innovation should play a leading role in promoting regional coordinated development. Building a regional model of "scientific and technological innovation system + new quality productive forces layout" according to local conditions, forming a new development pattern of comprehensive functional zones, promoting the westward shift of resource utilization industry layout, and emphasizing the cultivation of growth pole functions in key zones should become the main paths for regional coordinated development. Finally, the article discusses how to give full play to the strategic and fundamental role of major function zoning.

Keywords: 15th Five-Year Plan period, regional coordinated development, strategy, path

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1. Innovation in Regional Coordinated Development Since the 18th Party Congress

Since the 18th Party Congress, China has made innovative moves in regional coordinated development, manifested in two main aspects. First, taking poverty alleviation as the central theme of a tough battle, regional coordinated development has been achieved by promoting development in different types of regions. The essence of inter-provincial gaps in regional economic development lies partly in the fact that relatively underdeveloped provinces have large impoverished areas, significant proportions of poor regions, and high poverty incidence rates. By increasing support for impoverished areas and ensuring complete poverty eradication by the 100th anniversary of the Party' s founding, the "removal of

poverty county status" has bolstered regional development in areas where poor counties are relatively concentrated, such as the Western Development and Central Rise regions. Both western and central regions have experienced periods of economic growth surpassing that of the eastern region, effectively promoting regional coordinated development. There are roughly three types of poverty-causing conditions in China: areas with resources but lacking infrastructure for development; areas with resource development but problematic distribution mechanisms preventing local governments and residents from receiving deserved benefits; and areas lacking resource endowments for development. The first type yields the best poverty alleviation results, with most areas in southwestern China belonging to this category. Due to the outstanding poverty alleviation effects in southwestern China, its economic growth momentum has been more significant than in northwestern China, which is also a reason for the expanding north-south gap in recent years.

Second, taking key ecological function zone construction as the starting point, regional coordinated development has been achieved by promoting the unity of ecological and economic benefits across different functional zones. At the national scale, key ecological function zones, major agricultural product production zones, and urbanized areas are the three most important functional zone types. Among them, key ecological function zones have the most backward regional economy and living standards nationwide. Under the strategic guidance of strengthening ecological security barrier construction, prioritizing ecological protection, and maintaining sustainable development for the Chinese nation, establishing necessary mechanisms for realizing ecological value to improve economic benefits in ecological function zones and achieve the unity of ecological and economic benefits has become a main component of ecological civilization institutional reform. Ecology has become a comparative advantage for regional development, forming new drivers for regional development and helping promote regional coordinated development. China has made innovative moves in promoting regional coordinated development that no developed country has experienced in its modernization process—vigorously fighting poverty and prioritizing ecological development before reaching the development stage of per capita GDP of 10,000 USD. This represents a Chinese-characteristic model of regional coordinated development that combines poverty-stricken areas with key ecological function zones, which are China's poorest major functional zone types. When superimposed with special functional zones such as ethnic minority areas and border areas, this model' s greatness becomes even more prominent.

2. Unprecedented Challenges for Regional Coordinated Development in the 15th Five-Year Plan Period

From a practical development perspective, economic laws indicate that when per capita GDP reaches around 10,000 USD, comprehensive cost factors such as labor, land resources, and environmental costs rise, necessitating transformation of the development model. Relying on scientific and technological progress

to improve labor productivity and increase labor income benefits has become an inevitable choice for developed countries in their industrialization process and the fundamental tool for developing countries to escape the middle-income trap and join the ranks of developed countries. China is currently at this critical development stage of per capita GDP around 10,000 USD. China' s modernization faces even more arduous challenges than developed countries faced in their time, including: greater pressure on resources and environment as global total supply and environmental capacity can hardly meet development needs of all countries; very limited market acceptance capacity for expanding consumption amid the current global economic cycle of oversupply; unfavorable environments created by developed countries in global rule-making and technological barriers; and continuous disruption of China' s original production chains by large developing countries through lower-cost mid- to low-end production. In short, China' s further economic growth must optimize supply, expand markets, and enhance competitiveness, making its dependence on scientific and technological innovation stronger than that of developed countries. In a sense, scientific and technological innovation is the fundamental way for the Chinese nation to avoid or escape the middle-income trap.

3. Theoretical Exploration and Strategic Innovation for Regional Coordinated Development in the 15th Five-Year Plan Period

3.1 New Theoretical Explorations on Regional Coordinated Development Early theories explaining regional economic layout and coordinated development mainly included theories of labor geographical division and cooperation, spatial economic agglomeration-radiation-dispersion, and regional economic integration and spatial equity. These theories effectively revealed the mechanisms of regional comparative advantage competitiveness, inter-regional economic interactions, and evolution of industrial spatial patterns. In response to the basic characteristics and requirements of Chinese-style modernization, three theoretical considerations can serve as important theoretical foundations for guiding China' s future regional economic layout and coordinated development.

First, the equilibrium theory of spatial development. Traditional regional economic development theory holds that the core driver for ultimately achieving regional equilibrium and narrowing regional gaps is the potential energy formed by regional economic disparities that drives spatial reallocation of production factors, making regional economic development equilibrium the goal of regional coordinated development. However, as human civilization enters the new form of ecological civilization and the new development stage of continuously improving human well-being, the goal of regional coordinated development is for regional development pattern evolution to enter a stable state that manifests not merely as regional economic equilibrium. Two recent phenomena support this judgment: when people choose between location A (high economic income but poor ecological environment) and location B (low economic income but good

ecological environment), assuming all other conditions are equal, some people will always choose location B, indicating that the gap in ecological environment quality compensates for the gap in economic income level, with equilibrium resulting from the comprehensive benefits of ecology and economy; the timing of large numbers of migrant workers returning from cities to their hometowns for employment and life does not occur because the urban-rural income gap has disappeared (urban income levels remain higher than rural areas), but because social benefits such as family care, kinship, and hometown sentiment play a role, meaning that the comprehensive benefits of economic income and social benefits form an equilibrium between urban and rural areas, reducing the unidirectional flow potential energy of migrant workers from rural to urban areas to zero. The spatial development equilibrium theory corrects the traditional regional economic equilibrium theory' s limitation of focusing only on economic gaps, using the gap in comprehensive benefits of economy, ecology, and society as the potential energy for regional development patterns to reach a stable state. The goal of regional coordinated development should point toward comprehensive equilibrium of economic, ecological, and social benefits. The strategic and policy value of this theory lies in the fact that different regions may have different comparative advantages in economy, ecology, and society, and leveraging these comparative advantages in different fields can all serve as important strategic choices for achieving regional coordinated development, with policy reforms aiming to realize the valuation of ecological and social benefits.

Second, the spatial organization theory of node source and sink in flow-space economic networks. When a region is an open system, the inflow and outflow of various production factors and products make each region a node of source and sink. Undoubtedly, the development goal of nodes can be summarized as striving to expand the sink function of various production factors inflow and enhance the source function of various product outflows. From a geographical perspective, this development goal inevitably leads to two important geographical processes: the enhancement of sink function inevitably leads to continuous expansion of space needed for processing and production of various production factors—when a node becomes a world-class city facing the globe, the required processing and production space is typically at least the scale of an urban agglomeration; the enhancement of source function inevitably leads to continuous expansion of external market coverage, with increasing influence and control in production and service fields. The combination of these two processes yields the core content of the flow-space economic network node source-sink spatial organization theory: to become a world-class city with influence and control, one must enhance the ability to gather various production factors, especially high-quality ones; meanwhile, one must cultivate urban agglomerations as the space for processing and utilizing gathered production factors, and exert influence and control by selling commodity products to larger markets, and vice versa. To promote regional coordinated development and achieve modernization in an open system, we must focus on global production factors and consumer markets, build highlands with global influence and control, and simultaneously

achieve high-quality regional coordinated development and high-level regional development equilibrium.

Third, the spatial convergence theory of innovation chains and industrial chains. In the past, innovation chains and industrial chains were not necessarily spatially coupled. For a long period, Beijing' s scientific and technological innovation achievements were mostly industrialized in China' s southeastern coastal areas. The emergence of Silicon Valley in the United States changed the spatial pattern where technological innovation achievements on the U.S. West Coast were industrialized on the East Coast. The emergence of Beijing' s Zhongguancun High-tech Park has reversed Beijing' s development strategy and greatly increased the proportion of nearby transformation of scientific and technological achievements. The Pearl River Delta region, which has been at the forefront of institutional and mechanism innovation nationwide, has also recognized that local scientific and technological innovation is a weak link in its modernization construction, and cultivating and enhancing scientific and technological innovation capabilities has become an important task in the development strategy of the Guangdong-Hong Kong-Macao Greater Bay Area. The spatial convergence of innovation chains and industrial chains has become an important development trend. The theoretical discussion of its formation mechanism mainly focuses on how spatial proximity facilitates the maturation of a learning society, enables more convenient communication between the supply side of innovation and the demand side of industry, and allows innovation to focus on limited objectives for rapid spiral ascent through learning and exchange processes, ultimately creating a regional innovation system and industrial system with distinctive features and comparative advantages that interact efficiently. The policy enlightenment of this theoretical thinking is the need for overall planning of innovation chains and industrial chains—building innovation chains divorced from industrial chains with comparative advantages is not viable, and building industrial chains divorced from innovation chains with comparative advantages is not competitive. Of course, constructing an innovation system focusing on global scientific and technological innovation highlands is a discussion at another spatial scale.

3.2 Key Points of Strategic Innovation for Regional Coordinated Development in the 15th Five-Year Plan Period On the new journey to achieve Chinese-style modernization, regional coordinated development is both a goal and a path, with different emphases at different development stages. The basic thinking for regional coordinated development toward 2035 is: it is possible to leverage the development potential of developed areas and create new drivers to achieve modernization goals first; meanwhile, accelerate the development speed of underdeveloped areas, open new tracks, and cultivate growth poles; and simultaneously enhance underdeveloped areas' supporting capacity for developed areas to achieve modernization first. By 2035, while significantly narrowing the gaps in living standards and economic development levels between developed and underdeveloped areas, both should jointly support the realization of the first-stage goal of Chinese-style modernization. The period from the 15th

Five-Year Plan to 2035 is an extraordinary development stage where opportunities and challenges coexist, with challenges outweighing opportunities. Based on comprehensive analysis of development conditions and theoretical thinking on regional coordinated development, we should adapt to new globalization trends and grasp new advantages in China' s two-way opening pattern, giving equal importance to enhancing the growth energy level of eastern developed areas and cultivating new drivers in western underdeveloped areas. We should coordinate the layout of new quality productive forces and guide the new industrialization process, focusing on incremental agglomeration of new quality productive forces in eastern developed areas while enabling western underdeveloped areas to follow new industrialization paths based on relatively advantageous industrial chains. We should adapt to people' s consumption upgrading and the "dual carbon" green development goals, re-examining local natural resource advantages, ecological environment values, cultural resource advantages, and strategic location conditions, linking the reconstruction of local industrial chains with enhancing positions in global industrial chains. Driven by domestic demand, China' s scientific and technological innovation should capture the commanding heights of world science and technology while strongly and effectively supporting the formation of industrial chains and economic competitiveness across China. Therefore, regional coordinated development during China' s 15th Five-Year Plan period is a path to achieve Chinese-style modernization, while regional coordinated development facing 2035 is even more a goal of Chinese-style modernization.

The effectiveness of strategic innovation for regional coordinated development during the 15th Five-Year Plan period depends on how well scientific and technological innovation plays its main driving role. China' s further economic growth must optimize supply, expand markets, and enhance competitiveness, making its dependence on scientific and technological innovation stronger than that of developed countries. To this end, we must properly handle the relationship between the general laws of innovation-driven development and the special laws of promoting regional coordinated development through innovation according to local conditions, forming an innovation model where innovation chains and industrial chains fit together, interact positively, and synergistically improve in terms of development timing, spatial layout, and structural optimization, and building a regional model driven by scientific and technological innovation. We must properly handle the relationship between the common responsibility of the whole society and the main responsibility of the scientific community—the whole society must fulfill the common responsibility of innovation-driven development, optimize mechanisms and environments that encourage and tolerate innovation, eliminate blind spots in innovation-driven development, and truly make innovation the primary driver of development. We must properly handle the relationship between leveraging the advantages of the national system and direct investment of state resources—government power must neither be absent nor overstep its bounds in innovation-driven development, and we must also form a technological innovation system with enterprises as the main body, market orientation, and deep integration of industry, academia, and research.

We must properly handle the relationship between the value orientation and economic benefits of innovative talents—while creating an innovation culture among scientific and technological workers with realizing the Chinese Dream of the great rejuvenation of the Chinese nation as the core value, we must establish mechanisms where those who make more contributions to scientific and technological innovation can obtain more economic benefits, and those who achieve more results in innovation-driven development can gain more economic returns.

4. Path Selection for Regional Coordinated Development in the 15th Five-Year Plan Period

4.1 Building Regional Models of "Scientific and Technological Innovation System + New Quality Productive Forces Layout" According to Local Conditions China's inter-regional development differences are substantial, requiring differentiated development paths according to local conditions in all fields of resources, environment, and socio-economic development, and the same applies to the "scientific and technological innovation system + new quality productive forces layout."

First, activating and maximizing the initiative of scientific and technological innovation in developed areas is key. Different models for promoting new quality productive forces through scientific and technological innovation exist within developed areas. The Beijing-Tianjin-Hebei world-class urban agglomeration should take national scientific and technological innovation forces as the main body, capturing global scientific and technological innovation commanding heights and leading China to become a science and technology powerhouse while supporting regional economic development. The Guangdong-Hong Kong-Macao Greater Bay Area should take high-tech enterprise innovation as the main body, addressing shortcomings in talent cultivation and the scientific and technological innovation chain to meet the urgent needs of regional economic development for scientific and technological innovation. The Yangtze River Delta and middle reaches of the Yangtze River urban agglomerations should give full play to the dual main body role of national scientific and technological innovation forces and enterprise innovation. The enterprise-based scientific and technological innovation systems formed in earlier years in Northeast China' s old industrial bases and the Third Front regions (including Chengdu-Chongqing, Guanzhong, etc.) must be revitalized by combining them with the repositioning of state-owned economy and reshaping of heavy equipment manufacturing and defense industries.

Second, attention must be paid to differences between developed and underdeveloped areas. In recent years, compared with China' s regional economic development level gaps, the gaps in scientific and technological innovation levels between developed and underdeveloped areas are even larger. This has become the biggest bottleneck in achieving regional coordinated development on the new journey of innovation-driven development. To prevent underdeveloped areas from falling behind or becoming a drag on Chinese-style modernization,

we must not only focus on cultivating scientific and technological innovation forces around local characteristic economic development directions but, more importantly, create new mechanisms for inter-regional scientific and technological innovation cooperation, using administrative power to solve the innovation-driven development problems in underdeveloped areas within the national innovation "whole chessboard." We should leverage institutional advantages to allocate strategic scientific and technological resources. In the development process of various countries, science and technology promotion of underdeveloped areas development has mainly relied on administrative power, and China has even greater institutional advantages in this regard. Similar to the practice of cadres serving in western regions for promotion, in the selection and recommendation procedures and standards for important national talents, we could consider whether candidates can work in western regions for a certain period as a selection indicator, establishing the consciousness that receiving honors from the Party and state means sharing the Party' s concerns and solving national difficulties and putting this into action. In the near term, we should strictly restrict or even prohibit public institutions (mainly higher education institutions and research units) in eastern developed areas from "poaching" talent from western public institutions. We should adapt to market laws and use economic levers to enhance underdeveloped areas' innovation capacity in solving characteristic scientific and technological problems. The focus of western innovation should be on how to transform resource advantages into industrial advantages, based on energy and mineral resources, biological resources, and spatial resources, oriented toward new materials, new energy, big health and bioengineering, and military-civilian integration. We should use economic means such as investment, projects, and remuneration to implement a system where western and eastern regions have equal work but significantly higher pay in the west, implement income tax reduction policies for scientific researchers with outstanding contributions to western development, and provide retirement benefits based on years spent working in the west, creating a social atmosphere and institutional guarantee where those who dedicate their youth and life to western development receive lifelong care. Simultaneously, we should issue regulations that major science and technology special projects must be supported only if western research institutions occupy a high proportion, and implement actions for national research institutions to take the lead in establishing research networks and bases in the west. We should push enterprise innovation to an important position and improve innovation output efficiency in the west by establishing incentive funds and mechanisms for enterprise innovation and achievement transformation in the west, implementing corporate income tax reductions or rebates for enterprises whose industrialization of research results promotes western economic development, and significantly increasing the additional benefits obtained from achievement transformation in underdeveloped areas.

Third, we should take cultivating new drivers of new quality productive forces through scientific and technological innovation as the starting point to optimize the scientific and technological innovation system and major productive forces

layout. China should leverage its two major advantages—allocation of scientific and technological innovation forces and control over major productive forces layout—to reshape the scientific and technological innovation system, optimize major productive forces layout, and create a new development pattern. We should give play to the hub position of scientific and technological innovation centers or highlands in building new development patterns. Adapting to the new development pattern with domestic circulation as the mainstay, China is expected to form 10-12 comprehensive functional development plates in the future. Each plate should be driven by scientific and technological innovation centers, centered on urban agglomerations and metropolitan areas, and rely on multi-provincial economic integration to build innovative regional economic systems with prominent comparative advantages and relatively complete industrial chains, construct relatively complete regional ecosystems and ecological security barriers, form high agricultural product self-sufficiency capabilities, and become important spatial units supporting the new development pattern with domestic circulation as the mainstay. This objectively requires that regional scientific and technological innovation force layout should align with the comparative advantages and development characteristics of regional economic plates. We should determine the division of labor and positioning of scientific and technological innovation force layout in the national scientific and technological innovation system according to the division of labor and positioning of regional economic plates in the "dual circulation." We should enhance the degree of spatial integration between innovation and industry, guiding new quality productive forces to concentrate in urban agglomerations and metropolitan areas. Relying on established scientific and technological innovation capabilities and strong economic foundations, we should further gather global innovation factors in the Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta, Chengdu-Chongqing, and middle reaches of the Yangtze River urban agglomerations, accelerate the cultivation of future industries, improve strategic emerging industries, and build national highlands for new quality productive forces layout and participation in global competition. Relying on location advantages near developed areas and traditional industrial foundations, we should focus on improving investment and business environments in the Shandong Peninsula, Central Plains, coastal Guangdong-Fujian-Zhejiang, Guanzhong Plain, and Beibu Gulf metropolitan areas, actively undertake industrial transfers from developed areas, optimize and upgrade traditional processing and manufacturing industries, concentrate on advanced equipment manufacturing, and build key areas for national new industrialization. Relying on natural resource endowments and strategic location advantages at the forefront of the "Belt and Road" opening-up, we should accelerate the development of advantageous industries such as new energy and new materials and industries related to foreign trade, cultivate and strengthen plateau biological resources and characteristic agricultural and sideline product deep processing industries, and build new growth poles for China' s regional economy. Relying on the defense industry foundation, we should stimulate the vitality of defense science and technology resources in Chengdu-Chongqing, Guanzhong, central and southern Liaoning, and central Shanxi urbanization

areas, accelerate the development of military-civilian integration industries, actively undertake industrial backups, and build pilot demonstration zones for military-civilian integration development.

4.2 Forming a New Development Pattern of Comprehensive Functional Zones Comprehensive functional zones are spatial organization units with national or regional innovation centers or highlands as the core, central cities or metropolitan areas and urban agglomerations as hubs, and cross-provincial regional economic integration as the foundation. Their division is guided by the three major regional development strategies (Beijing-Tianjin-Hebei coordinated development, Yangtze River Economic Belt, and Guangdong-Hong Kong-Macao Greater Bay Area construction), following the new requirements of building a new development pattern with domestic circulation as the mainstay and domestic-international dual circulation promoting each other, adapting to innovation-driven development, giving play to the role of urban agglomerations and metropolitan areas, strengthening regional coordinated development, relying on relatively complete natural geographical units, and forming integrated functional zones of ecological space, social-cultural space, and industrial-economic space. Constructing 10-12 comprehensive functional zones that, under the premise of resource and environmental carrying capacity, leverage regional comparative advantages to achieve matching and relative completeness of innovation chains-industrial chains-supply chains-value chains within comprehensive functional zones, and enable equal-value development and balanced development between comprehensive functional zones. The layout of 12 comprehensive functional zones is shown in Figure 2 [Figure 2: see original paper].

The positioning of comprehensive functional zones is as follows: (1) Northeast Comprehensive Functional Zone: a national equipment manufacturing and commodity grain supply base, a comprehensive functional zone for Northeast forest ecological security barrier and ecological product value realization. (2) Beijing-Tianjin-Hebei Comprehensive Functional Zone: a global innovation network hub, world-class modern industrial base and ecologically livable urban agglomeration, a comprehensive functional zone for national urban agriculture integrated development and typical coordination between inland sea and watershed ecology. (3) Lower Yellow River Comprehensive Functional Zone: a national major energy and manufacturing base and major grain production area, a comprehensive functional zone for national water and soil conservation and Chinese cultural heritage protection. (4) Yellow River "Ji Zi Wan" (Bend) Comprehensive Functional Zone: a national energy base, heavy chemical industry base and animal husbandry base, a comprehensive functional zone for important national soil conservation and windbreak and sand fixation. (5) Northwest (Arid) Comprehensive Functional Zone: a core area of the "Belt and Road," national energy base, fruit-cotton-grain-livestock production base, and comprehensive functional zone for water source conservation and windbreak and sand fixation. (6) Yangtze River Delta Comprehensive Functional Zone: a world-class

scientific and technological innovation and modern industrial base and high-efficiency urban agglomeration, a comprehensive functional zone for national rice and freshwater fish main production areas and key restoration and protection of downstream Yangtze River lake and wetland ecosystems. (7) Middle Reaches of Yangtze River Comprehensive Functional Zone: a national important modern manufacturing base and commodity grain-cotton-livestock-fishery base, a comprehensive functional zone for important national water source conservation and river-lake ecology. (8) Sichuan-Chongqing Comprehensive Functional Zone: a national scientific and technological innovation center, advanced manufacturing base and large-scale grain-oil-livestock production base, an inland opening strategic highland and comprehensive functional zone for biodiversity maintenance. (9) Yunnan-Guizhou-Guangxi Comprehensive Functional Zone: a national green energy base and regional resource intensive processing base, an ecological functional zone for soil conservation and subtropical biodiversity maintenance, and an important gateway for opening-up to South and Southeast Asia. (10) Qinghai-Tibet Plateau Comprehensive Functional Zone: a main area for national ecological security barrier and national park construction, a reserve base for national strategic mineral resources and clean energy, and a comprehensive functional zone for ecological product value-based poverty alleviation boosted by "dual carbon" goals. (11) Cross-Taiwan Straits Comprehensive Functional Zone: a national advanced manufacturing base and characteristic agricultural development base, an ecological functional zone for subtropical biodiversity maintenance, and a platform for exchanges and cooperation between people on both sides of the Taiwan Strait. (12) Guangdong-Hong Kong-Macao Comprehensive Functional Zone: a world-class emerging industry and modern service industry cluster and ecologically livable urban agglomeration, a national base for scientific and technological innovation and high-quality rice and aquaculture, and a comprehensive functional zone for "one country, two systems" and land-sea ecological coordination.

4.3 Promoting the Westward Shift of Resource Utilization Industry Layout This path is based on several considerations: following automobiles and real estate, China' s consumption structure is upgrading toward the large tourism industry, whose characteristics include large-scale natural experience of diversity, green-based cultural and sports leisure in harmony between humans and nature, learning about earth' s human habitats showcasing natural mysteries and humanistic charm, and self-driving tours as the main transportation mode with relatively long time periods. Western regions are undoubtedly important spatial carriers for this. Achieving the "dual carbon" goals makes western regions important bases for new energy construction, especially given their resource endowments, geographical locations, and construction space conditions that provide combined advantages for building composite energy bases of wind-solar-hydro-nuclear plus traditional fossil energy, enabling them to become key areas for transformation of production and lifestyle under the "dual carbon"goals and freeing up more environmental and development space for eastern regions.

With enhanced supply chain security needs, western resource-rich areas are conducive to strategic resource exploration and development and the construction of rough processing systems based on strategic resources. The vast western regions should follow the path of transforming resource advantages into economic advantages, accelerating the local green transformation of resource advantages in western-dominated areas, and cultivating new regional economic growth clusters. In the Gobi and desert areas of western Inner Mongolia, northwestern Gansu, northwestern Qinghai, and eastern and southern Xinjiang, we should focus on deploying a batch of green energy production and bulk scarce strategic mineral resources development and processing bases, significantly enhancing the security and green low-carbon level of China' s industrial and supply chains. In national parks, nature parks, and historically and culturally resource-rich areas in central and western China, we should build experiential and learning-oriented tourism regional brands, construct a national backyard garden system, drive local characteristic economic development, and meet comprehensive consumption upgrading needs. We should strengthen the combination of western regions' unique animal and plant resources with eastern modern biotechnology research and development, cultivate modern biological industry chains of "company + R&D + farmers + logistics," build western modern biological industry clusters, and cultivate western future industry incubation and growth bases. We should cultivate natural resource processing industry chains centered on cities such as Lanzhou, Xining, Urumqi, Kashgar, Lhasa, and Kunming, forming new growth clusters for China' s regional economy.

4.4 Emphasizing the Cultivation of Growth Pole Functions in Key Zones First, the edge zones of urban agglomerations. Promoting regional coordinated development must still adhere to the strategic choice that urbanization is the necessary path to modernization, with urban agglomerations, metropolitan areas, and central cities remaining important carriers for economic development. It should be recognized that the core of regional coordinated development is ostensibly the equilibrium between regions but is essentially the equilibrium of a region' s capacity to absorb economic resources and agglomerate population. Therefore, economic agglomeration must be accompanied by synchronous population agglomeration, which is the fundamental measure to promote regional coordinated development. Additionally, regional coordinated development involves different spatial scales—from the national scale there are coastal-inland and north-south development imbalances, within each province there are center-periphery spatial structures of regional imbalance, and internal 不协调 between regions within urban agglomerations has become one of the important manifestations of low-quality urban agglomeration development. Taking the edge zones of urban agglomerations as key cultivated growth poles to absorb economic radiation from central cities, especially in the overall planning of new quality productive forces layout, the edge zones of urban agglomerations are undoubtedly key zones with comparative advantages in development foundation and potential.

Second, central regions and their westward extension zones. Since reform and opening-up, China' s regional economic development pattern has shown a diamond-shaped region enclosed by the vertices of Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta, and Chengdu-Chongqing urban agglomerations, which provides about 75% of China' s economic output, with this proportion remaining relatively stable. Since the 18th Party Congress, the central region of this diamond, especially the Yangtze River basin' s central part, has experienced rapid economic growth due to the radiation and driving effects of coastal developed areas such as Beijing-Tianjin-Hebei, Yangtze River Delta, and Pearl River Delta. While strongly supporting the stable growth of China' s total economic volume, this has also become a major factor in the emergence and continuous expansion of the north-south gap. In the future, we should continue to enhance central regions' capacity to undertake radiation and driving effects from the east, leverage their traditional industrial and agricultural comparative advantages, and narrow development gaps with eastern regions. Meanwhile, we should cultivate central regions' extension into western China to reshape China' s economic map. Among these, the Fen-Wei Valley and Chengdu Plain areas in western regions could potentially be cultivated in the short term to become key zones where development capacity and level merge with central regions and become frontier zones for western regions to achieve modernization first.

Third, western regions and strategic sub-centers. Looking at China' s economic map, the far western regions of the Qinghai-Tibet Plateau and northwestern arid zones are core areas for cultivating new economic growth poles and promoting western development to a new stage. We should accelerate the introduction of regional development strategies for the Qinghai-Tibet Plateau and northwestern arid zones to guide healthy and orderly development in these two regions, which will help achieve China' s regional coordination goals. For the Qinghai-Tibet Plateau, with a "green development strategy" as the theme, we should continuously enhance the plateau' s ecological security barrier function while building a world-class ecological and cultural tourism destination, forming a regional green development cluster around national park groups, constructing a green development belt along border towns, rationally deploying green mining and green energy development bases, orderly promoting plastic-free and other green lifestyle consumption patterns, enhancing safety in high earthquake-risk zones on the plateau' s edge, and building a global ecological civilization highland. For northwestern arid zones, with a " 'dual control' transformation development strategy" as the theme, in the orderly transition from energy dual control to carbon emission dual control, we should focus on enhancing the carbon sink capacity of the entire ecosystem, accelerate the construction of solar and wind energy production bases, achieve industrial structure transformation from high energy consumption to high green energy consumption, reconstruct new agricultural and pastoral production and processing systems supported by green energy, improve the quality of life in harmony between humans and nature in oases, and build a green development demonstration zone for the "Belt and

Road." In the development of far western regions, we should take Kashgar and Nyingchi as key cultivated cities to build western strategic sub-centers, enhancing the two cities' agglomeration capacity and radiation driving role as regional central cities in southern Xinjiang and eastern Tibet respectively.

5. Giving Full Play to the Strategic and Fundamental Role of Major Function Zoning

Major function zoning is based on in-depth and systematic scientific research. According to three functional types—urbanized areas, major agricultural product production zones, and key ecological function zones—it determines the major functional positioning undertaken by each county-level administrative unit in China, forming the first blueprint of the national territorial space development and protection pattern based on local major functional positioning. The urbanization, agricultural product, and ecological security strategic patterns extracted from this blueprint serve as strategic guidance for coordinating socio-economic development with resource and environmental protection and utilization and achieving spatial layout. Major function zoning is a scientific plan. Since the 18th Party Congress, major function zoning has risen to a national strategy, playing a strategic and fundamental role in "Beautiful China" construction. The 20th Party Congress proposed improving the major function zoning system and optimizing the territorial spatial development pattern. General Secretary Xi Jinping emphasized the deep integration of regional coordinated development strategies, major regional strategies, and major function zoning strategies, giving full play to regional comparative advantages, actively integrating into and serving the construction of new development patterns according to major functional positioning. Premier Li Qiang required using major function zoning strategy to guide rational economic layout. Major function zoning strategy is becoming a major strategy for economic development and ecological environment protection in Chinese-style modernization.

5.1 New Positioning of Major Function Zoning Strategy Adapting to Regional Coordinated Development Facing the new era, the major function zoning strategy must fully carry the new positioning of economic development and ecological environment protection strategies, moving from focusing on shaping security patterns to supporting high-quality development and promoting positive interaction and spatial coordination between high-quality development and high-quality security. First, we should improve the territorial space security system. We must strengthen the new territorial space security system composed of ecological security, land and water resources security, energy and mineral resources security, and national defense security, and build a new territorial space security pattern with the "three zones and four belts" ecological security barrier and "three control lines" land security guarantee as the backbone, complemented by the national backbone water network, national strategic energy and mineral development bases, and land-sea border security barriers. Second, we should use major function zoning strategy to guide ratio-

nal industrial layout. We must cultivate new development spaces that carry new-type urbanization, new industrialization, and comprehensive rural revitalization, and accelerate the formation of a new territorial space development pattern where new quality productive forces are concentrated in eastern urban agglomerations, the focus of resource development and processing industry layout gradually shifts westward, and major agricultural product production zones implement the spatial allocation of the "big food" concept.

5.2 Major Functional Positioning Adapting to the New Positioning of Major Function Zoning Strategy At the national level, the three major functional positionings should be adjusted respectively (Figure 3 [Figure 3: see original paper]). In response to the new period of Chinese-style modernization where urban agglomerations and metropolitan areas will fulfill more functions as scientific and technological innovation source areas and new quality productive forces development highlands, the positioning of urbanized areas should be adjusted from previous large-scale population agglomeration and industrialization areas to areas with highly concentrated scientific and technological innovation resources and key layout areas for new quality productive forces and new industrialization. The positioning of major agricultural product production zones should be adjusted from previous emphasis on grain safety production and guarantee base construction to county-level administrative areas for large-scale, commercialized production of agriculture, forestry, animal husbandry, and fishery products, adapting to mass consumption structure upgrading and the "big food" concept. Key ecological function zones should maintain their original positioning as county-level administrative areas with important ecological functions or fragile ecosystems that primarily provide ecological services or products.

Three types of major functional zones cover the entire territorial space. Based on new major functional positioning and resource and environmental carrying capacity and territorial spatial development suitability, we should leverage local comparative advantages, pay more attention to coordinating regional economic layout and territorial space utilization, pay more attention to coordinating high-quality development and high-level security, pay more attention to coordinating major functions and composite functions, pay more attention to classified control and comprehensive layout, and pay more attention to establishing and improving land management systems that more efficiently connect with macro policies and regional development, optimizing the spatial pattern of major function zones.

5.3 Giving Play to the Strategic and Fundamental Role of Major Function Zoning in Regional Coordinated Development Exploring systematic layout of functional zones upward and downward based on differentiated development is a reasonable approach for regional coordinated development to implement major function zoning strategy, optimize spatial patterns, and construct territorial space systems. Upward, we should form comprehensive functional zones to coordinate high-quality integrated development of multiple provinces and regions within larger regional scopes and achieve high-level

integrated protection of natural ecosystems at higher ecological levels. Downward, we should refine functional classification and zoning, exploring ways to refine functions according to local conditions, providing new refined functional classification systems and spatial zoning schemes for achieving positive interaction between high-quality development and high-quality protection. We should build a new territorial space system of "comprehensive functional zones, comprehensive functional sub-zones, major functional zones, and functional zones." While optimizing major functions, we should move toward coordinated composite functions, moving from spatial planning to more systematic modern spatial governance, giving play to the fundamental institutional role of major function zoning in institutional mechanism reform, improving supporting policy systems and promoting institutional mechanism reforms adapted to major function zoning strategy, and promoting the formation of a new pattern of territorial space development and protection with effective major functional constraints and coordinated territorial development.

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Note: Figure translations are in progress. See original paper for figures.