

Beyond the "Pearl River Model": Structuring National Spatialisation in the Guangdong-Hong Kong-Macao Greater Bay Area

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Abstract: The development transformation of the Guangdong-Hong Kong-Macao Greater Bay Area profoundly reflects the interactive logic between the evolution of regional models and the reconfiguration of national space. Based on the theoretical framework of national space, this paper discusses the structural process of the regional model and argues that: in the early stage of the "Pearl River Model", under its geographic location, social and institutional advantages, the "introduction-digestion" of industrial technology was embedded in the global industrial system, and decentralized competition effectively stimulated the vitality of the region. With the intensification of the negative effects of the regional economy, the transition to the "Bay Area Model" of regional synergy was initiated after 2008, and the national spatial form shifted from decentralized experimentation to strategic integration, with the Guangdong-Hong Kong-Macao Greater Bay Area realizing "re-domainization" in the reorganization of the scales. The Guangdong-Hong Kong-Macao Greater Bay Area has achieved "re-domainization" in the scale reorganization, and is moving towards a polycentric metropolitan area structure; in the future, regional planning and governance will require the construction of innovative spatial policy tools to coordinate institutional innovations and territorial reorganization mechanisms, to achieve the effective allocation of regional factors of production and promote the coordinated development and optimization of the spatial layout of the region.

Keywords: Pearl River model; Bay Area model; national spatialization; structuring

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A "model" is a regularity found in the development of the perceived world, design thinking, and abstract thought; identifying stable patterns is one of the basic functions of human cognition^[1]. At the macro level, the world contains diverse and complex patterns whose assemblage constitutes its structure and order. As Engels observed in *Anti-Dühring* when criticizing the "world schematism," the unity of the world lies in its materiality rather than mere existence^[2]. Material environments, social organizations, and economic processes assume multiple forms; abstracting from their concrete manifestations enables us to identify shared properties. At the micro level, an economic or social development model is a synthetic description of economic, social, and cultural conditions in a

particular time and place. Refining, summarizing, elevating, and transforming such models can help countries and regions achieve organizational breakthroughs and greater socioeconomic stability^[3].

The "Pearl River Model" summarizes the remarkable economic, industrial, social, and institutional adjustments achieved in the Pearl River Delta after reform and opening-up^[4]. It was a major positive-feedback model of global-local interaction. Maritime-oriented grassroots communities connected with global markets, moving from "borrowing a boat to go to sea" to "building a boat to go to sea" and developing an economy with "both ends abroad"^①. Market opening introduced the practices of "processing with supplied materials, components, and samples, plus compensation trade" and the "front shop, back factory" arrangement^②. Institutional experimentation at multiple levels produced special economic zones and decentralizing reform^③. Competition and interaction among these diverse actors jointly generated the early prosperity of the Pearl River Delta and shaped the original "Pearl River Model."

The Pearl River Model is often discussed alongside the Southern Jiangsu and Wenzhou models^[5-9]. Each was rooted in distinctive pre-existing social, economic, and institutional conditions and was both representative and highly specific^[9]. The Southern Jiangsu Model benefited from township governments and township and village enterprises during the transition from planning, whereas the Pearl River Model was distinguished by bottom-up, village-based rural community industrialization^[10].

The Pearl River Model was driven by rural communities seeking to close enormous economic gaps. Under policies that encouraged experimentation, the direct linkage of converted agricultural land with global capital generated substantial accumulation. Bottom-up institutional and policy synergies ultimately produced the widely dispersed prosperity described as "every village lighting a fire and every household emitting smoke"^[11]. The dynamic evolution behind this process reflected complex global-state-local interaction and generated structural change and reorganization across multiple territorial scales.

After 2008, the region began moving from the competition-oriented Pearl River Model toward the coordinated and integrated "Bay Area Model." Within the Pearl River Delta, struggles among power, capital, and spatial organization continually shaped state spatialization. The emphasis shifted from decentralizing experimentation to strategic integration; the Guangdong-Hong Kong-Macao Greater Bay Area emerged as a national strategic spatial unit and evolved toward metropolitan form, realizing reterritorialization through the restructuring of old and new social capital^[12-16]. The Pearl River Delta has since moved from dispersed competition toward a more coordinated whole, becoming a globally prominent socioeconomic unit under the identity of the Greater Bay Area and entering a new phase of transformation^[14].

How, however, should the transformation from the Pearl River Delta to the Guangdong-Hong Kong-Macao Greater Bay Area be analyzed on a territorial basis? What does the change of "model" reveal about regional transformation, and how are structural interaction and processual change manifested? These questions require further inquiry.

1 State Spatialization and Structuring

In examining capitalist expansion and the transformation of political-economic functions, Henri Lefebvre introduced the concept of the "state mode of production"^[17]. He emphasized the role of state institutions in producing and transforming the spatial landscape of modern capitalist society and highlighted the contradictions inherent in that process. Strong state intervention often produces homogeneous, fragmented, and hierarchical spaces, as the state seeks a balance among global and local capital flows, political power, and local organization^[18].

Debates on “new state space” are concentrated in geography and political science and focus on scale relations, state theory, and the reorganization of capital flows, institutions, social organizations, and infrastructure. When the framework is applied to Chinese cases, however, existing studies often generalize phenomena in ways that do not match the underlying mechanisms of Chinese development^[13]. Compared with the more focused concept of state spatialization, the new-state-space literature is more diverse and extensive, encompassing complex objects and concepts^[19]. Scholars have deconstructed this framework to examine regional reproduction from the perspective of multilevel actors of power and capital^[20-23].

If spatialization describes relational interaction and change in productive structures, including the dynamic production and reproduction of scales through internal and external interaction^[24], state spatialization focuses more specifically on the relationship among global expansion, state intervention, and local response. It reveals the new modes of production, structural orders, and systemic equilibria formed in territorial space. Capital, institutions, knowledge, labor, and other key regional assets continuously circulate between local and transnational arenas, while state intervention in multilevel flows makes the power relations among the state, regions, and enterprises increasingly complex.

Drawing on the sociological theories of Marx, Durkheim, and Weber^[25], “structuring” is understood as a way of thinking about, or a method for studying, changes in time, space, and social organization. The structuring of social organization reflects the relationship between the ordering of organizational formation and networks of human agency in social evolution^[26-27]. Applied to regional spatial evolution, the concept reveals the spatial orders and meanings of change generated through structuring. Historical processes and turning points shape not only spatial evolution but also deeper regional relations. Turning events and organizational agency jointly weave the relational networks of regional spatial structure. Structuring thus offers a dynamic evolutionary perspective from which local development models emerge, while models embody unity within regional diversity.

This study introduces the methodology of structuring^④ into an analysis of state spatialization centered on changes in modes of production and structural order. It seeks to identify how state capacity drives shifts in territorial boundaries, how strategic state action and project implementation create new state spaces, and how corresponding models can be recognized. Taking the Pearl River Delta as an empirical case, it examines the transformation from the Pearl River Model after reform and opening-up to the Bay Area Model of the Guangdong-Hong Kong-Macao Greater Bay Area, and traces the reconstruction of state spatialization amid continual change. The study offers an empirical perspective for critical discussion of regional governance and model-based research (Fig.1).

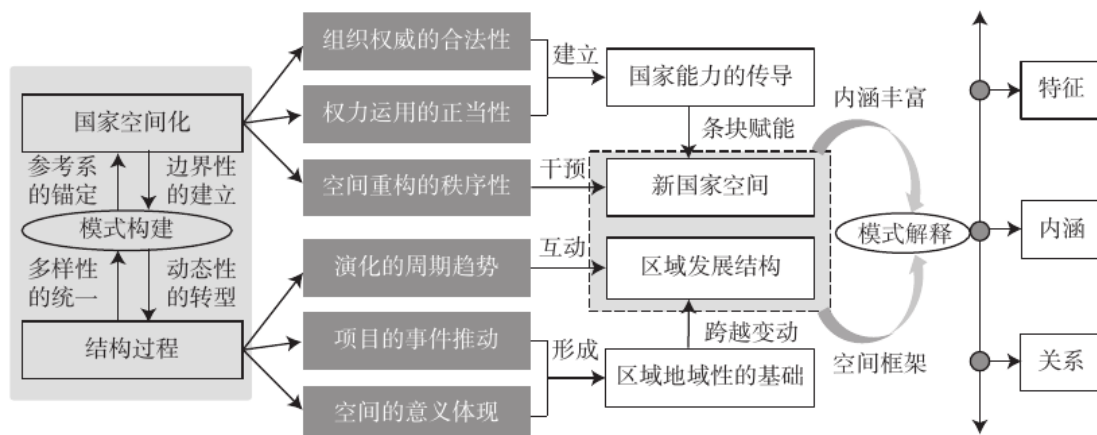


Fig.1 Interactive framework for spatialization, structuring of the state in the model

2 The "Bay Area Model" Beyond the "Pearl River Model": Toward an Innovation Bay Area

A region is both a specific social space and a geographical metaphor through which an analytical scale is materialized and naturalized. It produces a specific geographical unit while also generating multiple meanings and types of cognition^[28].

As a regional research unit, the Pearl River Delta has distinctive geographical, economic, and social characteristics. South of the Nanling Mountains and adjacent to the South China Sea, it is a critical interface between land and sea and a gateway for exchanges of maritime and terrestrial resources, providing important conditions for the Greater Bay Area to function as a pivot of China's dual circulation. The Nanling Mountains are simultaneously a boundary and a corridor linking the Yangtze and Pearl River basins; overlapping flows across that boundary have produced distinctive social and cultural features^[29]. Cross-border movements of people, goods, technology, and culture constitute the basic source of regional vitality, while interaction among state, social, and economic actors gives the region its analytical significance.

2.1 Trend of Change: From Dispersed Competition to Strategic Integration

Transformation toward the Greater Bay Area involves more than economic restructuring and upgrading. It also entails the construction of territorial power, culture, and capital-flow networks in a global-state-local framework. The objective of state spatialization has shifted from early decentralized competition to strategic integration.

Reform and opening-up made the coastal region a frontier for experimenting with market opening and institutional reform. In the early period, the Pearl River Delta adopted a strategy of "releasing water to raise fish," continuously attracting external capital through advantages in labor and land costs and learning institutions and technologies through a process of introduction, digestion, and absorption^[30]. Changes in economic growth and foreign investment since reform and opening-up reveal both the flourishing and the gradual transformation of the Pearl River Model. Taking the global financial crises of 1998 and 2008 as dividing points, the initial stage of bottom-up rural community industrialization saw the "three supplies and one compensation" system concentrate capital, technology, and labor and establish a foundation of labor-intensive industries. Foreign-invested enterprises once accounted for 42.75% of output in 1992. Their subsequent growth lagged behind the overall regional economy, and the Pearl River Delta shifted from "both ends abroad" toward a more balanced model of external attraction and internal linkage, becoming a lever connecting domestic and international markets and a key node in global production [Fig.2(a)]. As national opening expanded and the regional economy prospered, Hong Kong changed from the country's single most important geographical gateway to global industry into one among several such gateways, with a relative decline in its economic position [Fig.2(b)].

The scientific and technological transformation of economic and high-tech development zones, tax incentives for high-tech enterprises, and the success of firms such as Huawei, Midea, and Gree organized and concentrated industrial innovation clusters. Regional industry moved from introduction-digestion-absorption toward indigenous innovation and became a major node in the global production system through technological and productivity breakthroughs. The Pearl River Delta thus shifted from localized, dispersed, and ubiquitous competition toward an innovation-led and spatially restructured regional production system [Fig.2(c)].

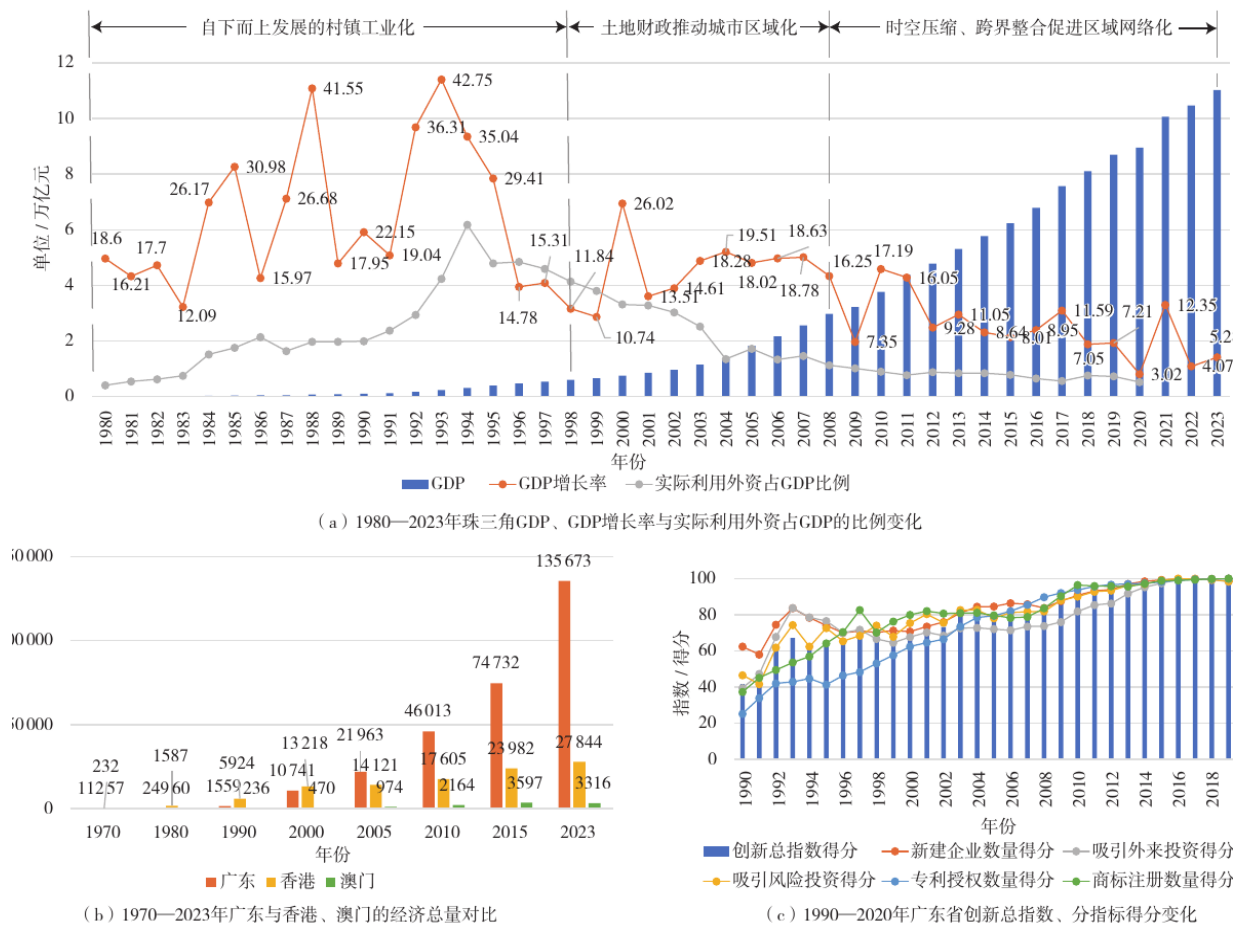


Fig.2 Change and comparison of the economy, investment, and innovation in the Pearl River Delta (Guangdong Province)

2.2 The Pearl River Model: Global Capital Directly Connects with Urban and Rural Communities, Generating Local Buzz

The Pearl River Model emerged through external and internal interaction. Global capital connected directly with rural community industrialization, while local private enterprises, individuals, and governments actively participated in the global market. Under geographical, social, and institutional conditions, economic activities of different scales formed complementary combinations and produced a distinctive development model. Its principal feature was “external attraction and internal linkage,” its basic spatial arrangement was “front shop, back factory,” and its early accumulation depended mainly on “three supplies and one compensation”^[31-32].

Through Hong Kong and Taiwan as gateways, the Pearl River Delta entered global production systems and linked to “global pipelines,” accelerating the transfer of industrial capital. Development zones in central cities and rural communities generated “local buzz” and strong multiplier effects. The global pipelines-local buzz concept explains how transnational firms exchange knowledge and innovation across the world: late-developing actors and regions obtain knowledge, technology, and capital spillovers through global pipelines. Once local actors accumulate sufficient economic and innovative capacity, they can transcend territorial limits and move from passive reception to active outward connection, creating more diverse global-local networks^[33-34].

Geographical data on registered enterprises in two periods between 1980 and 2000^⑥ show that Guangzhou and Shenzhen became the core nodes of local buzz. Dongguan, Zhongshan, Nanhai, and Shunde—the “four little tigers of Guangdong”^⑦—developed village-town industrialization systems based on specialized and territorially distinctive economies and became important network nodes. These nodes competed in a relatively flat structure and directly solicited foreign investment.

At this stage, state space remained a selective experiment in external opening. The region captured large benefits from geographical conditions and developmental disparities, while decentralizing incentives encouraged local institutional reform in pursuit of economic growth and improved living standards. The central government established credible incentives through opening and marketization and delegated authority to local governments. Shenzhen and Zhuhai were selected as special economic zones on the basis of social cost-benefit analysis, constituting important experiments in national economic policy^[35-36].

Political and economic incentives obtained through decentralization were complemented by the strong profit expectations of local private actors facing gaps with developed economies^[37]. Numerous “three supplies and one compensation” firms were introduced, and foreign-funded enterprises were established with capital from Hong Kong, Macao, and elsewhere. Township and village enterprises simultaneously absorbed advanced management experience and operating models and accumulated and upgraded industrial capital through continuous digestion and absorption. Cooperation under “three supplies and one compensation” and “front shop, back factory” connected cities and towns to global pipelines and generated industrial clusters of increasing scale and diversity.

2.3 Metamorphosis: Metropolitan Administrative Restructuring Reconfigures the Pearl River Model and Initiates Regional Reterritorialization

Territory originated as a concept defining an organism’s range of activity and competition for resources. In geographical and management studies it denotes the spatial interaction of organizations, power, and resources^[38]. Territorialization describes major spatial and scalar changes in regional production, while reterritorialization involves jumping scales or rescaling^[39]. As David Harvey argues, the capacity to transform space depends on the production of space^[40]. Under renewed global capital expansion, old and new social and capital spatial frameworks are continually created, destroyed, and reconstructed; reterritorialization takes place through struggles within and beyond territories^[40-41] (Fig.4).

At the beginning of reform and opening-up, national policy sought to control the size of large cities, develop medium-sized cities rationally, and promote small cities. Many processing-trade foreign enterprises and township and village enterprises settled in village-town industrializing areas of the Pearl River Delta. Their rapid growth also created problems: decentralized competition encouraged municipal and county protectionism and strengthened the “administrative-region economy,” obstructing the circulation of market factors. As production capital accumulated in formerly rural industrial areas, competition intensified, involution became pronounced, and new conditions and spaces for growth were difficult to generate.

After 2000, China’s accession to the WTO accelerated global capital and technology transfers built on the achievements of the Pearl River Model. The state also relaxed constraints on large-city development. Administrative boundary adjustments transformed existing territorial boundaries and initiated reterritorialization. Central cities sought specialization across wider territories, linked global and local industries, and shifted internal and external circulation.

In response to the 1997 Asian financial crisis, the state launched housing commercialization. Local governments used land revenue to subsidize industrial finance and optimized resource allocation around land, expanding their tax bases and accelerating the growth of population-concentrating central cities. State space in the Pearl River Delta became increasingly city-regional, promoting urban-rural integration and regional coordination.

In 2004, Guangdong Province and the Ministry of Construction jointly prepared the Coordinated Development Plan for the Pearl River Delta Urban Agglomeration (2004-2020). It proposed a world-class urban agglomeration, emphasized coordinated construction by central cities and surrounding hinterlands, and advocated a networked spatial structure with a reinforced regional "spine." Core cities began leading regional infrastructure connectivity and metropolitanization through time-space compression and factor interconnection. Analysis of enterprise data and innovation spatial units for 2001-2010^{⑥⑧} shows Guangzhou and Shenzhen expanding their hinterlands through infrastructure links and moving toward a metropolitan concentration-diffusion system. The Pearl River Model accordingly evolved from dispersed competition toward metropolitan competition and cooperation centered on core cities, laying the foundation for regional coordination and integration.

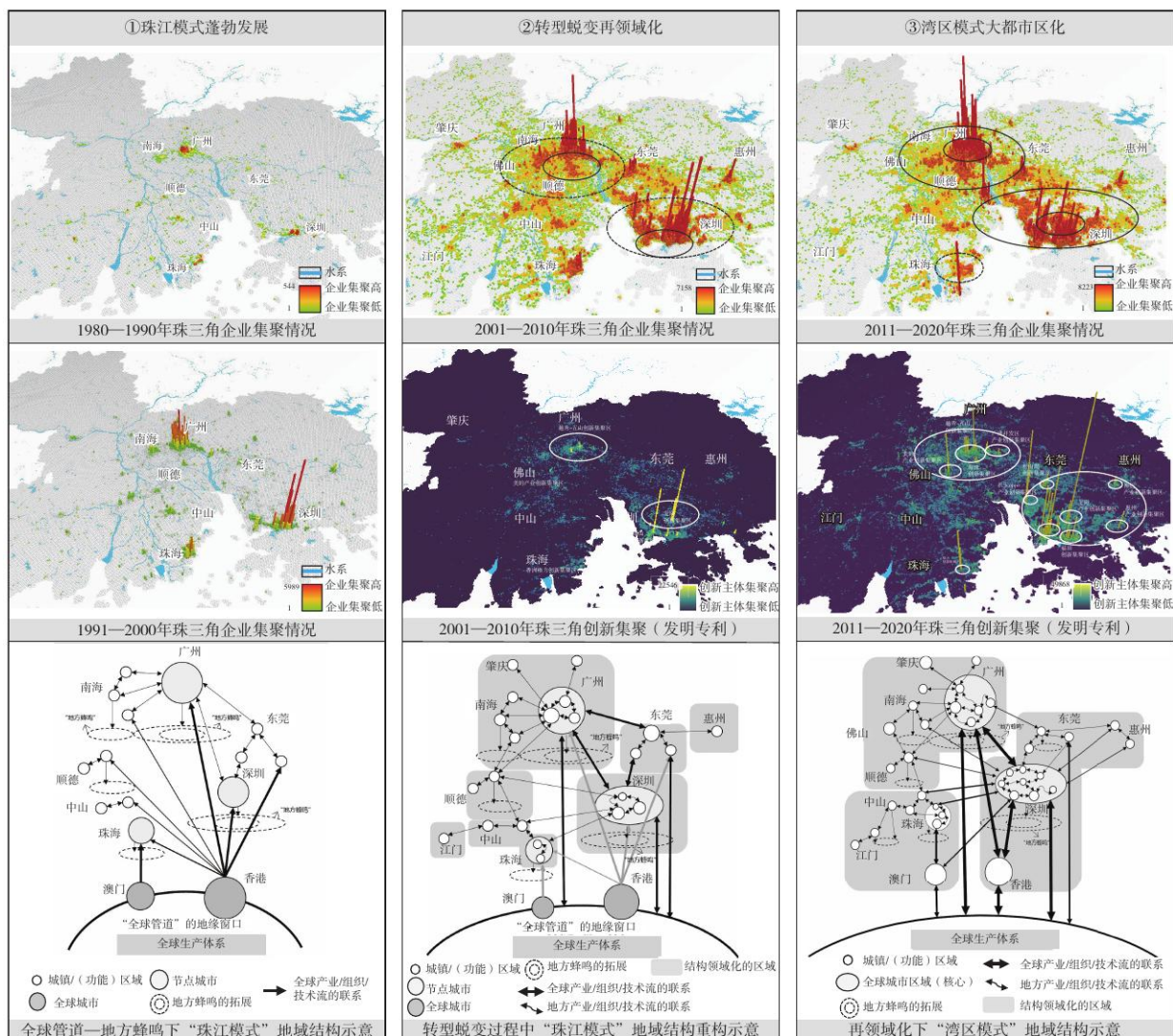


Fig.3 Structuring of transition from the "Pearl River model" to the "Bay Area model"

2.4 The Bay Area Model: Central Cities Lead an Emerging Metropolitan Structure and an Innovation Economy Drives the Greater Bay Area

The state spatialization of the Guangdong-Hong Kong-Macao Greater Bay Area has involved regional rescaling and industrial transformation. The integration of Hong Kong and Macao with the Pearl River Delta, major cross-sea infrastructure investment, and the policy allowing Hong Kong vehicles to travel north have supported the formation of a unified market. As a new stage in the Pearl River Model's evolution, the Bay Area Model is an innovation-oriented mode of coordinated regional development built on the earlier introduction-digestion-absorption stage. Whereas the earlier objective of state spatial construction was cumulative experimentation and connection, the current objective is coordination and innovation.

Through positive feedback between government and market, the Pearl River Delta has shifted from the "world's factory" toward an "innovation bay area"^[42-44]. Innovation is the central driver; firms of different sizes participate in global production networks; state capacity and local society jointly construct a unified regional market; and connectivity across scales creates an integrated, megaregional network and a development model based on new quality productive forces. Regional central cities function as hubs of dual circulation, metropolitan areas form a polycentric collaborative mega-city region, and industrial transformation provides the innovative foundation.

Analysis of enterprise and innovation spatial-unit data for 2011-2020^{⑥⑧} indicates that, under the global pipelines-local buzz model, industrial concentration in the Guangzhou and Shenzhen metropolitan areas became increasingly polarized, generating functional nodes at multiple levels and scales. Proximity among industrial clusters in geography, technology, and interaction produced diverse innovation spatial units. Preferential incentives in state-designated innovation targets and policy-experimental zones further polarized innovation and formed a regional innovation network.

At the global scale, the Greater Bay Area has become a reterritorialized political, economic, and cultural state-spatial unit. Locally, formerly dispersed rural industrializing areas have been connected to central cities through cross-boundary infrastructure, producing hierarchical and networked divisions of labor. Around the Guangzhou-Foshan and Shenzhen-Hong Kong metropolitan areas, these relations have created a major reterritorialized regional production system (Fig.3).

3 Spatial Restructuring of the Guangdong-Hong Kong-Macao Greater Bay Area and the Transformation of State Space

Through regional structuring, the Greater Bay Area has evolved from dispersed and competitive village-town industrialization toward a concentrated and specialized metropolitan system. Continuous construction of large regional infrastructure, including intercity rail, has compressed the time-space distance between central cities and surrounding areas and reconfigured economic space into a contiguous and broadly prosperous megaregional economy.

The transition from the Pearl River Model to the Bay Area Model has repeatedly rescaled the region and changed its developmental objectives and content.

First, under China's socialist market economy and the central government's vertical-horizontal administrative system, central ministries and local governments interact through both sectoral and territorial lines^[45]. The central and local governments employ an "administrative subcontracting system"—an optimized M-form structure—in which repeated centralization and decentralization generate integration and coordination^[46]. Higher-level governments vertically authorize local governments to formulate and implement public policies within their jurisdictions^[47]. This differs from capitalist new-state-space resource allocation: Chinese state capacity emphasizes balance within the whole and strong top-down allocation, whereas capitalist state space emphasizes comparative advantage and market-driven competition.

At the beginning of reform and opening-up, the principle that development was paramount and the delegation of authority and benefits encouraged local governments to act as developmental states^[48]. Governments in the Pearl River Delta competed for growth, producing the Pearl River Model of ubiquitous rural industrialization and local economic buzz. State-spatial selection was strategic and experimental: special economic zones were selected through socioeconomic cost-benefit analysis to expand opening and exploit the geographical and sociocultural advantages of coastal cities. Special policy zones differentiated state power and function geographically through institutions and relations at multiple scales. The central government supplied incentives, while provincial and municipal governments used decentralized and customized strategies to create comparative advantage and support initial capital accumulation and industrial clustering^[49].

Although the Pearl River Model successfully accumulated industrial capital through “three supplies and one compensation” and generated diversified clusters through global pipelines-local buzz, local races to the bottom intensified market blockades and protectionism, creating an imbalance between local and overall regional interests^[50-51]. State-spatial selection therefore shifted from local experimentation toward intervention for regional coordination.

As a unit with immense economies of scale, the Greater Bay Area became the subject of strategic projects at multiple scales. The Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area, the provincial 14th Five-Year Plan, and the Intercity Railway Construction Plan for the Greater Bay Area (2020-2030) strengthened regional planning as an instrument of scalar governance, softened administrative boundaries, promoted rescaling across places, increased the circulation of capital and social resources, and moved the region toward a polycentric, networked, and systematic spatial structure.

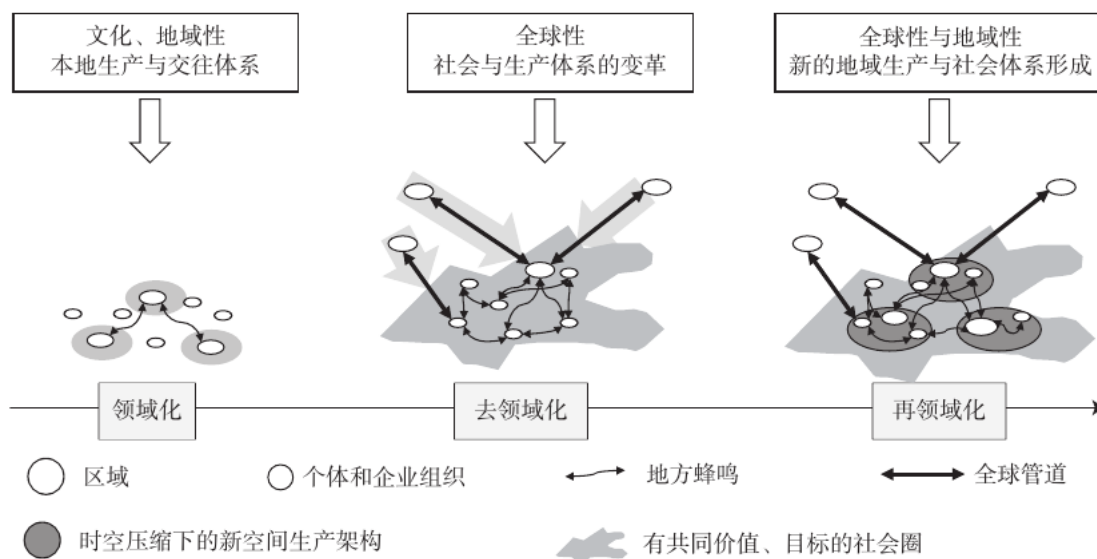


Fig.4 Shifting of regional scale in territorialization and re-territorialization^[34]

The Bay Area Model thus marks a change from local experimentation to regional coordination. Governance has moved from decentralized local profit seeking and urban entrepreneurialism toward regional scale, a unified market, intergovernmental cooperation, and state entrepreneurial leadership^[52]. As a strategic economic and social unit, the Greater Bay Area has been upscaled as a whole and internally restructured at multiple levels through state-spatial and strategic arrangements, advancing regional integration (Fig.5).

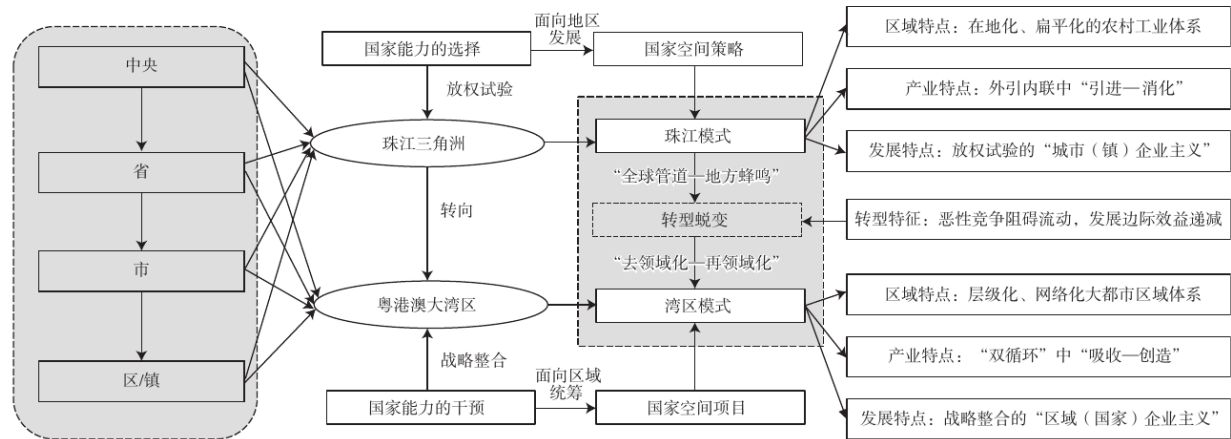


Fig.5 State spatialization from the "Pearl River Model" to the "Bay Area Model"

4 Discussion and Outlook

(1) The Pearl River Model constituted a field of selective experimentation in state space. Market-opening policies fostered special economic zones, while institutional reform generated bottom-up village-town community industrialization. Drawing on geographical, cultural, organizational, and institutional advantages, the Pearl River Delta developed diverse forms of local industrial-economic buzz and prospered through global-local industrial transfer and interaction.

(2) The Bay Area Model represents the state spatialization of the Pearl River Model. The Guangdong-Hong Kong-Macao Greater Bay Area is a major national strategy organized from above. The integration of Hong Kong and Macao with the Pearl River Delta, investment in major cross-sea infrastructure, and the Hong Kong vehicles northbound policy have contributed to a unified market.

(3) The move from primitive accumulation under the Pearl River Model to innovation under the Bay Area Model signifies a transformation in the objectives and content of state spatialization. Big-data measurement indicates that the Greater Bay Area has achieved reterritorialization and is entering a phase driven by innovation-economy coordination and the cultivation of new quality productive forces. Its regional pattern is shifting from dispersed node competition toward integrated cooperation in a mega-city region.

Historically, the Pearl River Delta was an active area of foreign trade where formal and informal organizations and transactions intermingled. Traditions of openness and commerce and extensive overseas social networks provided the basis for proactive reform and opening by local governments. They also show how the selection of the region for special-zone experimentation, decentralizing reform, and other state-spatial projects combined contingency and necessity.

The transformation from the Pearl River Delta to the Greater Bay Area is a process in which experimental organizational collisions move from exploration and innovation toward stable adaptation. The change from "both ends abroad" to domestic-international dual circulation and a unified regional market reflects state-spatial strategies designed to respond to changing internal and external conditions and to enhance regional competitiveness through innovation and new quality productive forces.

Regional planning and policy should comprehensively evaluate the efficiency of state-spatial projects and investments, guiding and adjusting dynamic spatial restructuring to promote regional coordination and optimize the spatial pattern. Because the world is nonlinear and development remains open to multiple directions, model research retains typological significance. State-spatial

strategies and project arrangements in particular periods are closely linked to territorial organizers, events, and social attributes beyond formal rules. This study operates at a macro structuring level and does not fully examine the agency of numerous actors or informal arrangements within regional units; these issues require further research.

The authors thank the anonymous reviewers for their important comments and suggestions regarding the concepts and argumentation of this article. The issues raised in the review and response have strengthened the paper and will support further research.

Notes

- ① "Building a boat to go to sea" refers to enterprises in the Pearl River Delta no longer being satisfied with "borrowing a boat" through Hong Kong intermediaries, who captured substantial margins. They instead established independently operated joint ventures and directly used overseas capital to transform production conditions and enterprises. "Both ends abroad" means that both raw materials and sales markets for local production were international.
- ② "Three supplies and one compensation" refers to processing with supplied materials, components, or samples, together with compensation trade. "Front shop, back factory" describes the distinctive territorial division of labor between the Pearl River Delta and Hong Kong and Macao: Hong Kong and Macao served as the outward-facing "front shop," while the Pearl River Delta functioned as the "back factory," in a complementary and mutually beneficial relationship.
- ③ "Special economic zones" refers to four special policy areas approved by the CPC Central Committee and the State Council in 1979 to improve the investment environment, encourage foreign investment, and introduce advanced technology and scientific management. Here it refers specifically to Shenzhen and Zhuhai. "Decentralizing reform" means the delegation of fiscal and administrative authority from the central to local governments, allowing local development policies such as the 1980s fiscal contracting system and the 1994 tax-sharing reform.
- ④ The research adopts a structure-process framework and treats model analysis as its baseline. Quantitative analysis uses functional-spatial agglomeration characteristics derived from multisource data to support the identification of developmental properties, while qualitative analysis integrates theoretical tools and field-based knowledge to construct the model-recognition system; the two are coupled.
- ⑤ Statistical panel data were organized by stage. Data for Fig.2(a) and Fig.2(b) were drawn from the City Statistical Yearbooks of Guangdong cities for 1980-2024, obtained through the National Bureau of Statistics. Fig.2(c) uses Chinese city innovation-index data for 1990-2020 from Peking University's innovation and entrepreneurship platform.
- ⑥ Enterprise data were scraped from Qichacha. Beginning in 1980, the data were organized into four ten-year periods: 71,540 enterprises in 1980-1990; 447,792 in 1991-2000; 1,029,275 in 2001-2010; and 1,145,935 in 2011-2020.
- ⑦ Dongguan, Zhongshan, Nanhai, and Shunde were core areas of early Pearl River Delta growth and developed four distinct models. Dongguan pursued export-oriented development; Shunde emphasized public ownership, industry, and large backbone enterprises; Zhongshan combined a mixed economy with township and village enterprises and foreign investment; and Nanhai promoted simultaneous growth of three sectors through "six wheels." They were compared with Asia's four little dragons and became known as Guangdong's "four little tigers."
- ⑧ Innovation data were obtained from the China Patent Publication and Announcement System of the China National Intellectual Property Administration. The data begin in 1980 and were

organized into four periods. Because invention-patent applications before 2000 were too few to be representative, geographical agglomeration was mapped only for 2001-2010 (134,313 applications) and 2011-2020 (1,289,130 applications).

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