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New Quality Productivity as the Driver of Reconstruction and Evolution Path of Future Industrial Spatial Layout

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Abstract: New quality productivity, with data, intelligent technology, and green energy as its core elements, is profoundly reshaping the spatial layout logic and evolutionary path of future industries. On the basis of clarifying the connotation of the theory of new quality productivity and its spatial economic characteristics, this article reveals the transformation of technology driven industrial site selection from traditional cost orientation to innovation ecology and computing accessibility priority. It analyzes the substitution and complementary effects of data element flow on geographical agglomeration and proposes a spatial reconstruction pattern of "polar core concentration and network extension". Furthermore, the formation and radiation diffusion of core innovation nuclei, the leapfrog upgrading of edge regions, the breakthrough of lock-in cross regional competition, and the path turning points under external shocks were explored. Research has shown that the industrial spatial evolution driven by new quality productivity presents new characteristics of multipolar symbiosis and networked collaboration, providing theoretical basis for regional planning and policy intervention.

1. Introduction

The new round of technological revolution and industrial transformation is accelerating, and the new quality productivity represented by artificial intelligence, big data, and clean energy is profoundly changing the allocation logic and spatial organization of production factors. The traditional location theory faces challenges in explaining future industrial layouts, as the high mobility of data elements and the remote collaborative capabilities of innovative networks make geographic agglomeration no longer the only prerequisite for industrial division of labor. However, there is still a lack of systematic theoretical explanation on how new quality productivity drives the reconstruction of future industrial spatial layout and the characteristics and laws of its evolutionary path. This article aims to construct an analytical framework for the reconstruction and evolution path of future industrial spatial layout driven by new quality productivity. It discusses the theoretical connotation, reconstruction logic, and evolution path from three levels, in order to provide theoretical reference for regional development planning and policy formulation.

2. Theoretical connotation and spatial economic characteristics of new quality productivity

2.1 Core elements and spatial agglomeration mechanism of new quality productivity

The core elements of new quality productivity are data elements, intelligent technology, green energy, and highly skilled innovative talents. These elements have high mobility, non-exclusivity, and increasing marginal returns, fundamentally changing the spatial allocation logic of traditional production factors. The remote and real-time transmission of data elements through digital infrastructure reduces the dependence of enterprises on geographically adjacent raw materials and low skilled labor, but at the same time, it has given rise to new types of aggregation nodes such as computing power hubs and algorithm research and development centers[1]. The research and development of intelligent technology highly relies on high-end talents and collaborative innovation networks, which promotes the concentration of technology intensive industries towards a few innovation poles with research-oriented universities and venture capital clusters. The layout of green energy is constrained by the distribution of wind and solar resources, guiding clean energy intensive industries to shift towards resource rich areas such as the northwest and coastal regions. The composite effect of core elements has formed a new spatial agglomeration pattern of "multi-point polarization+network connection", rather than the traditional single-center radiation mode.

2.2 Revision and Expansion of Traditional Location Theory by New Quality Productivity

The traditional location theory emphasizes the dominant role of transportation costs, labor prices, and market size in industrial layout, while the rise of new quality productivity has made knowledge spillover effects, data accessibility, and algorithm matching efficiency new location determining variables. Taking Weber's industrial location theory as an example, the importance of raw material index and labor coefficient has relatively decreased, replaced by the "digital access index" and "innovation density index"[2]. Kristal's theory of centrality also needs to be revised: digital platforms enable peripheral regions to bypass hierarchical systems and directly access global markets, weakening the inevitability of hierarchical service radiation. In addition, the new quality productivity has expanded the demand side assumption in Liaoshi's market location theory - intelligent algorithms can accurately predict and remotely activate potential demand, making market boundaries no longer determined solely by physical distance. Therefore, the new theoretical framework needs to introduce "network proximity" to replace some geographical proximity, and recognize the symbiotic relationship between virtual agglomeration and physical agglomeration.

2.3 Typical facts of spatial economic forms driven by new quality productivity

Empirical observations have shown that new quality productivity has given rise to three typical forms of spatial economy. The first type is the "virtual cluster area", that is, relying on the cloud platform and the industrial Internet, the R&D, design and manufacturing units distributed in different geographical locations work together online to form an industrial ecology without physical boundaries. The second type is the "computing power corridor", such as the eight major hub nodes under China's "East Data West Computing" project layout, whose spatial characteristics are manifested in the concentrated construction of large-scale data centers in energy-rich areas and climate suitable areas, driving industries such as data preprocessing and AI model training to move westward. The third type is "innovation enclave", which refers to the establishment of offshore incubators in developed cities in underdeveloped areas, utilizing external innovation resources to cultivate local future industries, and returning to land after maturity[3]. These facts indicate that spatial layout is shifting from being dominated by geographical agglomeration to a new pattern that emphasizes both geographical agglomeration and functional network connectivity.

3. The reconstruction logic of future industrial spatial layout

3.1 New criteria for spatial location selection of technology-driven industries

Technology driven industries no longer simply pursue low-cost labor and raw material production areas, but take innovation ecological concentration, computing power accessibility, and talent attraction effect as core site selection criteria. Priority will be given to settling in core cities with top universities and venture capital clusters in the R&D process, while remote completion processes such as data annotation and model training will spread to hub nodes in the central and western regions with lower computing power costs[4]. In addition, the compatibility of algorithm interfaces and real-time data exchange between upstream and downstream of the industrial chain are more important than the proximity of physical distances. This forms a new spatial division of labor principle of "polar core research and development+node training+remote deployment".

3.2 Substitution and complementarity of data element flow to geographical agglomeration

The high liquidity and low transmission cost of data elements have to some extent replaced the traditional demand for geographic clustering. Remote collaborative design and cloud-based manufacturing platforms enable enterprises to achieve efficient division of labor without having to concentrate all processes in the same park. However, data flow has not completely dissolved the agglomeration drive - high-frequency non-standardized information exchange and cross enterprise joint research still require face-to-face trust mechanisms and implicit knowledge transfer [5]. Therefore, data elements generate a binary effect of "replacing low value contacts and strengthening high-value agglomeration", promoting the evolution of industrial space toward a pattern of coexistence of a few high-density innovation poles and wide area distributed nodes.

3.3 Reorganization mode of separating innovation network and value chain space

The emergence of new quality productivity has given rise to the spatial decoupling phenomenon between innovation networks and value chains. Innovation activities such as basic research and prototype development are highly concentrated in a few knowledge core areas, while value chain links such as standardized production and testing verification are laid out in peripheral areas or overseas nodes based on cost and policy conditions. This separation is not out of order, but through the digital twin platform and the industrial Internet to achieve remote collaboration. The restructuring mode is manifested in three forms: headquarters research and development+remote pilot testing, core algorithm output+regional application adaptation, open source platform+distributed contribution network, forming a spatial restructuring architecture with clear functional division of labor.

3.4 Guiding effect of policies and infrastructure on new layout

Policy tools and new infrastructure play a significant guiding role in the restructuring of the new layout. The government has taken measures such as establishing future industry pilot zones, issuing computing power vouchers, and building cross regional data circulation hubs to guide enterprises to cluster towards planning nodes. The East West Computing Project and the national integrated computing power network have directly reduced the access cost of nodes in the central and western regions, changing the cost function of location selection for technology driven industries. At the same time, institutional arrangements such as pilot projects for cross-border data flow and cross domain protection of intellectual property also affect the cross regional configuration of innovation networks. The synergy between policy guidance and infrastructure layout has accelerated the formation and solidification of a new spatial pattern.

4. The path of future industrial spatial evolution under the influence of new quality productivity

4.1 Formation and Radiation Diffusion Path of Core Innovation Pole Core

Under the drive of new quality productivity, the formation of core innovation poles follows a three-stage path of "factor aggregation ecological self-strengthening external locking". In the initial stage, regions with top research universities, national laboratories, venture capital clusters, and high-density digital infrastructure will be the first to attract key sectors of future industries such as artificial intelligence, quantum computing, and manufacturing to settle in, forming initial clustering advantages for data, algorithms, and high-end talents. Entering the second stage, the innovation ecosystem enters a self-reinforcing cycle: successful cases attract more entrepreneurial teams and capital inflows, knowledge spillover effects accelerate and amplify with high-frequency interactions, and the embedding of platform-based enterprises and open source communities further reduces the transaction costs of collaborative innovation, resulting in a much higher technology iteration rate in the core region than in the peripheral regions. In the third stage, the patent network, technical standards, and talent community form a path lock, and the core nucleus generates strong adsorption and retention capabilities in upstream and downstream links. On the radiation diffusion path, it is not simply a geographical proximity spread, but is achieved through three channels: first, technology authorization and the relocation of derivative companies, transferring mature modules to areas with lower costs; the second is remote collaboration driven by digital platforms, which enables the algorithm capabilities and design instructions of the polar core to directly serve dispersed production nodes; the third is the "innovation enclave" model guided by policies, which involves setting up offshore incubators by embedding polar nuclei in the edge areas in reverse. The radiation pattern formed by this presents a dual feature of "polar core concentration and network extension", rather than traditional circular diffusion.

4.2 Functional Undertaking and Leapfrogging Upgrades in Edge Regions

Compared to the gradual path of passive acceptance of industries eliminated by the core area in traditional diffusion models, the new quality productivity provides a dual opportunity for functional absorption and leapfrog upgrading for the edge areas. At the functional level, edge areas rely on low-cost electricity, suitable climate conditions, and land resources to become the carrier of remote delivery links such as computing infrastructure, data storage and preprocessing, and algorithm annotation. The central and western nodes under the layout of the Eastern Digital Western Computing Project are typical, which form a regional data industry cluster by undertaking the computing power demand in the east on a large scale. However, the key to leapfrog upgrading lies in "asymmetric crossing": the edge region is not simply copying the development trajectory of the core polar core, but directly establishing competitiveness in specific niche fields through open source technology platforms, cloud development environments, and remote collaboration tools. For example, some regions rely on their clean energy endowment to develop green computing power, which in turn attracts the landing of high value-added links such as AI model training and low-carbon algorithm research and development, achieving a leap from computing power carrying to algorithm innovation. The initial investment in policies and infrastructure is crucial in this process - cross regional data circulation hubs, computing power dispatch platforms, and flexible talent introduction mechanisms can effectively reduce the transition threshold. It is worth noting that the success of the transition depends on whether the edge region can form a positive cycle of "functional embedding ability acquisition autonomous iteration", avoiding being trapped in a locked state of only providing low-end computing power rental services. Once the critical point is broken, the edge regions are expected to transform from peripheral nodes of the industrial chain to sub centers of innovation in segmented fields, forming an evolutionary pattern of functional complementarity rather than dependence with the core polar core.

4.3 Competition and Locking Breakthroughs in Cross Regional Collaborative Evolution

In the process of reshaping the spatial pattern of new quality productivity, complex evolutionary relationships of competition and cooperation coexist among different regions, while facing the risk of path locking and breakthrough mechanisms. At the competitive level, each core city is fiercely competing in the layout of computing power hubs, the application for future industrial pilot zones, and the introduction of top talents, attempting to establish its dominant position in the innovation network. At the cooperation level, the cross regional flow of data elements, the interconnection of industrial Internet platforms, and the remote collaboration between upstream and downstream of the industrial chain force regions to establish complementary labor division relationships, such as the vertical collaboration model of "eastern algorithm research and development+western model training". However, this competitive structure may evolve into an imbalanced pattern of "core lock-in, edge attachment" - the core polar core continues to siphon off elements with its first mover advantage, while the edge regions remain in low value-added links for a long time. The breakthrough path mainly relies on three types of mechanisms: firstly, institutional innovation, which reduces the transaction costs of cross regional flow of factors through market-oriented allocation reform of data elements and cross regional benefit distribution mechanisms; the second is technological impact. The new generation of communication technology and blockchain smart contracts have brought the efficiency of distributed collaboration closer to the localization level, weakening the agglomeration monopoly advantage of the core area; the third is policy intervention, such as the balanced layout of major scientific and technological infrastructure guided by the national level, and the tilt of computing power subsidies towards underdeveloped areas, actively breaking the cycle of lock-in. It is worth noting that locking in breakthroughs does not negate the leading role of the polar core, but rather promotes the transformation of competition and cooperation from "center periphery" one-way dependence to "multipolar symbiosis" networked collaboration while maintaining innovation efficiency, providing a more resilient evolutionary path for future industrial spaces.

4.4 Stability and turning points of evolutionary paths under external shocks

The future industrial spatial evolution path driven by new quality productivity is not advancing in a nonlinear manner. When facing external shocks such as technological mutations, geopolitical, public health crises, or drastic fluctuations in energy prices, it exhibits certain stability characteristics, as well as possible path turning points. Stability comes from three mechanisms: firstly, the redundant design of digital infrastructure and remote collaboration networks, which prevents local interruptions from causing the paralysis of the entire production network; secondly, the multipolar nuclear symbiosis pattern disperses systemic risks and avoids chain collapse caused by the paralysis of a single center; thirdly, open source ecosystems and distributed innovation networks have strong self-healing capabilities, which can quickly restructure collaborative links that have been disrupted and cut off. However, when the impact intensity exceeds the threshold, the evolutionary path may undergo irreversible changes. Typical turning points include: the new generation of universal technologies (such as the practical application of quantum computing) disrupting the existing logic of computing power layout, leading to a sharp decline in the value of existing data center hubs; geopolitics hinders the cross-border flow of data, forcing innovation networks to shrink inward or rewire; the frequent occurrence of extreme weather events has raised doubts about the physical security of computing power nodes in the western region, leading to a resurgence of computing power deployment to the east. Identifying the precursor signals of these turning points, such as sudden breakthroughs in key technologies, fundamental shifts in policy environments, and exposure of infrastructure vulnerabilities, and establishing adaptive regulation mechanisms, is the core proposition for ensuring the stable evolution of future industrial spatial layout.

5. Conclusion

New quality productivity is reshaping the basic logic and evolutionary path of future industrial spatial layout through the deep integration of data elements, intelligent technology, and green energy. Research has shown that spatial location selection criteria are shifting from traditional cost orientation to prioritizing innovation ecology and computing power accessibility, forming a new pattern of "polar core concentration and network extension". The edge regions face strategic opportunities from functional transfer to leapfrog upgrading, while cross regional competition and cooperation relationships need to be cautious of path locking risks and rely on institutional innovation and technological shocks to achieve breakthroughs. External shocks may trigger a turning point in the evolutionary path, and there is an urgent need to establish adaptive regulation mechanisms. Future research can further quantify the efficiency threshold of collaborative evolution between different regions and explore the optimal timing and intensity of policy intervention.

References

[1] Yang Yuxiu. New Quality Productive Forces and Emerging Industries: Mutual Promotion Mechanism and Synergistic Development Path[J]. Governance Modernization Research, 2026, 42(03): 50-58.

[2] Liu Tengfei, Han Ling, Liu Naijia. A Study on the Development Law of Future Industries and the Cultivation Path of New Quality Productive Forces[J]. Economic Circle, 2026, (03): 44-52.

[3] Guo Hui, Li Jianhong. A Study on the Impact of New Quality Productive Forces on High-Quality Development of Foreign Trade—Based on the Transmission Mechanisms of Factor Allocation, Industrial Structure, and Intellectual Property Protection[J]. Price Monthly, 2026, (05): 84-94.

[4] Shang Xuefeng, Liang Haifeng. Competing for Future Space: Strategic Layout and Breakthrough Path of Industrial Leapfrog Development in Guangdong Province[J]. Technology and Finance, 2025, (12): 45-46.

[5] Hu Haipeng, Liu Pei, Wu Shousheng, et al. Research on Spatial Layout and Design of Future Parks from the Perspective of Industrial Chain: A Case Study of Smart Home Appliances[J]. Technology and Industry, 2024, 24(06): 207-214.