

Research on the Coupling Mechanism of New Quality Productive Forces and High-level Talent Teams in Ecological Functional Areas

-- Also on the Industry-Talent Synergy Model under the Background of the "Hundreds, Thousands, and Ten Thousands Project"

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Abstract: As China's economy shifts towards a stage of high-quality development, developing new quality productive forces has become the fundamental driving force for promoting regional economic leaps. For ecological functional areas that bear the dual mission of ecological barriers and green development, how to break the "dual constraints" of weak industrial levels and insufficient talent supply under the strategic background of the "High-quality Development Project for Hundreds of Counties, Thousands of Towns, and Ten Thousands of Villages" (hereinafter referred to as the "Hundreds, Thousands, and Ten Thousands Project"), and achieve a benign coupling between new quality productive forces and high-level talent teams, is a major theoretical and practical issue that needs to be solved urgently. Based on the system coupling theory, this paper deeply analyzes the interaction logic between new quality productive forces and talent teams in ecological functional areas, pointing out that there exists a symbiotic relationship of interdependence and mutual promotion between the two. The study finds that current ecological functional areas face realistic dilemmas such as significant talent siphon effects, serious mismatch between industry and talent, and a lack of innovation platforms. Based on this, this paper constructs a four-dimensional coupling mechanism of "Industrial Traction, Talent Support, Institutional Guarantee, and Environmental Empowerment." Furthermore, combining the county revitalization practices of the "Hundreds, Thousands, and Ten Thousands Project," it proposes collaborative innovation models for industry and talent, such as "Reverse Enclave" talent introduction, "Craftsman-type" local cultivation, and "Migratory Bird-style" flexible think tanks. The aim is to provide a new path of high-quality development driven by talent for underdeveloped ecological functional areas to transform "lucid waters and lush mountains" into "invaluable assets."

Keywords: New Quality Productive Forces; High-level Talent; Ecological Functional Area; Coupling Mechanism; "Hundreds, Thousands, and Ten Thousands Project"; Industry-Talent Synergy.

1. Introduction

1.1. Research Background and Significance

1.1.1. Era Background: The Rise of New Quality Productive Forces and New Propositions for Regional Development

Currently, a new round of scientific and technological revolution and industrial transformation is developing in depth. General Secretary Xi Jinping creatively proposed the scientific concept of "New Quality Productive Forces," emphasizing the need to "integrate scientific and technological innovation resources, lead the development of strategic emerging industries and future industries, and accelerate the formation of new quality productive forces." New quality productive forces are marked by a substantial increase in total factor productivity; their characteristic is innovation, their key lies in high quality, and their essence is advanced productive forces. This assertion not only points out the direction for China's high-quality economic development but also provides new guidelines for the differentiated development of different types of regions.

For economically developed regions like the Guangdong-Hong Kong-Macao Greater Bay Area, developing new quality productive forces implies more about breaking

through "stranglehold" technologies and seizing the commanding heights of global science and technology. However, for the vast ecological functional areas (such as the Northern Guangdong region), the connotation and path of developing new quality productive forces are distinctly different. These areas are constrained by ecological red lines and cannot follow the old path of high energy consumption and high pollution industrialization. They must rely on green technological innovation, ecological value transformation, and digital economy empowerment to explore a new path of quality development characterized by "ecological industrialization and industrial ecologicalization." In this process, talent is the primary resource and the most active and decisive dynamic subject in new quality productive forces.

1.1.2. Policy Background: The "Hundreds, Thousands, and Ten Thousands Project" and the Urgent Need for County Revitalization

The "High-quality Development Project for Hundreds of Counties, Thousands of Towns, and Ten Thousands of Villages" (abbreviated as the "Hundreds, Thousands, and Ten Thousands Project") implemented by the Guangdong Provincial Party Committee aims to break the urban-rural dual structure and promote the revitalization of the county economy. Ecological functional areas are mostly located in

counties and rural areas and are the main battlefield of the "Hundreds, Thousands, and Ten Thousands Project." The implementation of this project has provided huge policy dividends and market space for the transformation of county industries from traditional agriculture and small/micro processing industries to modern agriculture, ecological cultural tourism, and green manufacturing. However, industrial transformation and upgrading have posed unprecedented challenges to the knowledge structure, technical level, and innovation ability of talents. Currently, ecological functional areas generally face the problem of "hollowing out," and the shortage of high-level talent has become the "biggest bottleneck" restricting the formation of new quality productive forces in counties.

1.1.3. Research Significance

On the theoretical level, this paper places "new quality productive forces" and "talent coupling" within the specific field of "ecological functional areas" for research, expanding the research horizons of regional economics and talent geography, and enriching the theoretical system of catch-up development in underdeveloped areas. On the practical level, by exploring the industry-talent synergy model under the background of the "Hundreds, Thousands, and Ten Thousands Project," it provides actionable path references for Northern Guangdong cities like Qingyuan on how to utilize ecological advantages to attract talent and how to activate green productive forces through talent dividends, possessing distinct practical guiding significance.

1.2. Definition of Core Concepts

1.2.1. New Quality Productive Forces in Ecological Functional Areas

New quality productive forces in ecological functional areas refer to the advanced productive force state of high technology, high efficiency, and high quality generated by relying on green technological innovation, digital empowerment, and institutional mechanism reform to deeply develop and efficiently utilize traditional ecological resources under the premise of strictly protecting the ecological environment. Its specific manifestations are: First, Greening, i.e., low-carbon and environmental protection in the production process; Second, Intelligence, i.e., the deep penetration of digital technology in fields such as agriculture, tourism, and manufacturing; Third, High-valorization, i.e., increasing product added value through brand building and deep processing.

1.2.2. High-level Talent Teams

In the context of ecological functional areas, high-level talent teams refer not only to top scientists or academicians but also include three types of key talents: First, Science and Technology Leading Talents, who can break through key green and low-carbon technologies; Second, Innovative Entrepreneurs, who can integrate resources to promote industrialization; Third, High-skilled Application Talents (Craftsmen of Great Powers, Rural Craftsmen), who can transform technology into actual productive forces and serve the front lines of modern agriculture and advanced manufacturing.

1.2.3. Coupling Mechanism

Coupling originates from a physics concept, referring to the phenomenon where two or more systems influence and unite with each other through various interactions. The coupling of new quality productive forces and talent teams refers to a

dynamic process where industrial upgrading generates demand traction for talent (absorption effect), and talent aggregation in turn drives technological progress and industrial transformation (driving effect), with both matching and coordinating in scale, structure, quality, space, and time.

2. Theoretical Basis and Logical Framework

2.1. Industry-Talent Relations under the Perspective of System Coupling Theory

2.1.1. The "Magnetic Attraction" and "Screening" Effects of Industry on Talent

Industry is the carrier of talent aggregation. According to the industry life cycle theory, during the incubation and growth periods of new quality productive forces, the demand for innovative talent shows explosive growth. In ecological functional areas, as the "Hundreds, Thousands, and Ten Thousands Project" promotes the construction of modern agricultural industrial parks and green industrial parks, the improvement of industrial levels will generate a powerful "magnetic attraction effect," attracting capital, technology, and management talent. Meanwhile, the high technological threshold of new quality productive forces will "screen" the labor market, eliminating low-skilled labor and forcing the optimization and upgrading of the regional talent structure.

2.1.2. The "Incubation" and "Multiplication" Effects of Talent on Industry

Talent is the creator of new quality productive forces. According to endogenous growth theory, the accumulation of human capital is the source of technological progress. High-level talent, through knowledge spillover, technological innovation, and entrepreneurial activities, can "incubate" new business formats and business models (such as ecological e-commerce, carbon sink trading). In addition, talent aggregation can produce a "1+1>2" multiplication effect through collaborative effects, significantly increasing total factor productivity and driving ecological functional areas to leap from resource-dependent to innovation-driven development.

2.2. Specificity of Industry-Talent Coupling in Ecological Functional Areas

2.2.1. Non-linear Coupling under Constraints

Unlike the strong market-led coupling in developed regions, industry-talent coupling in ecological functional areas is subject to stronger environmental and institutional constraints. Due to the lack of agglomeration economies brought about by large-scale industrialization, the coupling process is often non-linear. In the early stage, it may face a low-level equilibrium trap of "weak industry - few talents," requiring strong intervention from external forces (such as government policies, counterpart assistance) to break the deadlock and leap to a high-level virtuous cycle of "strong industry - talent gathering."

2.2.2. The "Hundreds, Thousands, and Ten Thousands Project" as a Coupling Catalyst

The "Hundreds, Thousands, and Ten Thousands Project," through means such as financial transfer payments, infrastructure construction, and equalization of public services, actually provides a kind of "institutional compensation" for ecological functional areas. This compensation reduces the living costs and opportunity costs

for talent working in underdeveloped areas, while also reducing the innovation risks for enterprises through industrial support, thus becoming a key catalyst for accelerating the coupling of new quality productive forces and talent teams.

3. Realistic Dilemmas of Coupling New Quality Productive Forces and Talent Teams in Ecological Functional Areas

Despite broad prospects, underdeveloped areas represented by the Northern Guangdong ecological functional area still face profound structural contradictions in promoting the coupling of new quality productive forces and talent teams.

3.1. The Dual Squeeze of "Talent Siphon" and "Industrial Hollowing"

3.1.1. Unidirectional Talent Outflow Caused by Regional Potential Differences

Under the market mechanism, factors always flow to regions with higher rates of return. The core cities of the Guangdong-Hong Kong-Macao Greater Bay Area, relying on their strong economic potential, complete industrial chains, and high-quality public services, have formed a sustained "siphon effect" on surrounding ecological functional areas. Research shows that the return rate of students from places like Qingyuan after entering university is generally low; even for skilled talents trained in local vocational colleges, over 60% flow to the core area of the Pearl River Delta after graduation. This phenomenon of "peacocks flying southeast" leads to a severe "talent shortage" when ecological functional areas develop new quality productive forces such as the digital economy and biomedicine.

3.1.2. Insufficient Industrial Carrying Capacity Limiting Talent Efficacy

Talents need to be retained and used well after being introduced. Currently, the industrial structure of many ecological functional areas is still dominated by traditional agriculture and low-end processing industries. There are few high-tech enterprises, small scales, and a lack of high-level innovation platforms such as national laboratories and new R&D institutions. Many high-level PhDs and experts find no place to use their skills after being introduced, and scientific research results are difficult to transform, eventually leading to "leaving due to disappointment," forming a vicious cycle of "Introduction - Idleness - Loss."

3.2. Supply-Demand Mismatch: The Disconnect between the Education Chain and Industrial Chain

3.2.1. Disconnect between Discipline/Major Settings and Industrial Needs

Although some ecological functional areas possess certain vocational education resources (e.g., the Guangdong Provincial Vocational Education City is located in Qingyuan), the major settings of institutions often lag behind, making it difficult to keep up with the rapid iteration of new quality productive forces. For example, the scale of talent training for emerging fields urgently needed by the "Hundreds, Thousands, and Ten Thousands Project," such as smart agriculture, rural planning, ecological restoration, and cross-border e-commerce, is too small, while talents in traditional

fields like secretarial work and accounting are in surplus, leading to a structural contradiction where "enterprises cannot recruit people" and "students cannot find jobs" coexist [1].

3.2.2. The "Two Skins" Phenomenon of Industry-Education Integration

In practice, school-enterprise cooperation often becomes a formality, remaining at the level of listed internships and simple lecture exchanges. Enterprises are not highly motivated to participate in talent training, lacking deep mechanisms for course co-construction and joint technology research. The knowledge students learn in school is disconnected from the actual production technology of enterprises, requiring long-term "retraining" after graduation to take up posts, severely restricting the formation efficiency of new quality productive forces.

3.3. Institutional Barriers and Shortcomings in the Service Ecosystem

3.3.1. Limitations of Rigid Talent Introduction Policies

In the past, ecological functional areas mostly relied on rigid policies such as staffing (Bianzhi), household registration (Hukou), and settling-in allowances to attract talent. However, in the era of new quality productive forces, talent flow is more high-frequency and flexible, making the traditional "ownership" talent introduction model appear rigid. Especially for some "migratory bird-type" talents who are unwilling to give up the life circle of big cities but are willing to provide intellectual services, there is a lack of flexible recognition and incentive mechanisms.

3.3.2. Comprehensive Gap in County Retention Environment

The "Hundreds, Thousands, and Ten Thousands Project" goes deep into the county, town, and village levels, where the soft environment such as medical care, education, culture, and entertainment has a huge gap compared to the Greater Bay Area. For young talents, the lack of high-quality social circles and high-quality educational resources for children are core pain points hindering them from taking root at the grassroots level. Although the ecological environment is beautiful, the psychological gap of "good mountains, good water, but good loneliness" makes the stability of the talent team extremely poor.

4. Construction of Coupling Mechanism for New Quality Productive Forces and Talent Teams in Ecological Functional Areas

Addressing the above dilemmas, it is necessary to adhere to a systemic concept and construct an all-around, multi-level coupling mechanism to promote deep industry-talent integration.

4.1. Precise Docking Mechanism between Industrial Chain and Talent Chain

4.1.1. Drawing Talent Maps Based on Industrial Chain Atlas

Ecological functional areas should center on the leading industries determined by the "Hundreds, Thousands, and Ten Thousands Project" (such as Qingyuan's five major ten-billion-level agricultural industries, green building materials, ecological cultural tourism), comb through various links of the industrial chain (R&D, design, production, marketing),

and draw a precise "Industrial Talent Demand Atlas." Through big data means, real-time monitoring of catalogs of scarce talents can be achieved, realizing a shift in talent introduction from "blind net casting" to "searching according to the map."

4.1.2. Talent Aggregation Model Driven by "Chain-Owner" Enterprises

Leverage the core role of industry leading enterprises (chain owners) in technological innovation and talent aggregation. Support chain-owner enterprises to lead the formation of innovation consortiums and introduce core technical teams in packages through the "Project + Talent" method. The government can directly grant talent quotas and research funding to chain-owner enterprises, giving them greater power in talent evaluation and usage, realizing "where the industry is, the talent gathers."

4.2. Deep Integration Mechanism between Innovation Chain and Education Chain

4.2.1. Localization Reform of Order-based and Modern Apprenticeship Models

Relying on resources like the Provincial Vocational Education City, comprehensively promote the training model of "School-Enterprise Dual System, Integration of Work and Study." Open "Named Classes" and "Order Classes" targeting the frontline skill needs of new quality productive forces. Especially in agriculture-related majors, explore the training path of "Employment upon Enrollment, Taking up Posts upon Learning," moving classrooms to fields and factory workshops to cultivate a group of "New Farmers" and "Rural CEOs" who understand technology, are good at management, and know how to operate [2].

4.2.2. Co-construction and Sharing of Industry-Education Integration Training Bases

The government funds the construction of public training centers and pilot-scale test bases, opening them to small, medium, and micro enterprises and universities for free or at low cost. Encourage university teachers to work in enterprises as "Technology Vice Presidents" and enterprise engineers to enter schools as "Industrial Professors," breaking institutional barriers to achieve faculty interchange, equipment sharing, and joint technology research.

4.3. Collaborative Empowerment Mechanism of Policy Chain and Service Chain

4.3.1. Differentiated "Talent Special Zone" Policies

Delineate specific industrial parks or innovation nodes within ecological functional areas to establish "Talent Management Reform Pilot Zones." Within the pilot zones, explore more radical tax incentives, distribution ratios of scientific research achievement transformation income (e.g., increasing to over 70%), and "Direct Train" systems for professional title reviews. Especially for special talents in the field of new quality productive forces, a policy of "One Case, One Discussion" and "One Person, One Policy" can be implemented.

4.3.2. Full Life-Cycle Talent Service Ecosystem

Build a service system covering the full chain of "Introduction, Cultivation, Use, and Retention." In addition to solving worries like housing and medical care, focus on creating social platforms such as "Maker Spaces," "Talent Stations," and "Academic Salons" to enhance talent's sense of belonging and identity. Combined with Party building

guidance, establish a system for leading cadres to contact and serve experts, providing warm political care and emotional services.

5. Innovation of Industry-Talent Synergy Models under the Background of the "Hundreds, Thousands, and Ten Thousands Project"

In terms of specific practical paths, ecological functional areas should combine their own endowments to explore synergy models with differentiated competitive advantages.

5.1. "Reverse Enclave" Model: R&D in the Bay Area, Production in Northern Guangdong

5.1.1. Model Connotation and Logic

Given the reality that high-level talents are difficult to introduce to mountainous areas full-time, ecological functional areas should break administrative division restrictions and actively "go out." Establish "Sci-Tech Innovation Enclaves" or "Offshore Incubators" in resource-rich areas like Guangzhou and Shenzhen through leasing or co-construction.

5.1.2. Operation Mechanism

Enterprises register in the ecological functional area and pay taxes locally but conduct R&D and office work in the "Reverse Enclave." In this way, enterprises can utilize the talent resources and information advantages of the Greater Bay Area while enjoying the land and labor cost advantages and policy dividends of the ecological functional area. For talents, working in the Bay Area while contributing to Northern Guangdong requires no change in their living environment, greatly reducing resistance to talent introduction [3].

5.2. "Science and Technology Backyard" Model: Zero-Distance Research Rooted in Local Soil

5.2.1. Model Connotation and Logic

Addressing the difficulty of technology promotion in the development of agricultural new quality productive forces, draw on the experience of China Agricultural University to establish "Science and Technology Backyards" in the fields of ecological functional areas. Graduate students and expert teams are stationed in rural frontlines for long periods, living, eating, and working with farmers.

5.2.2. Operation Mechanism

Guided by solving actual agricultural production problems (such as quality improvement of Lianzhou flowering cabbage, disease prevention of Qingyuan chicken), carry out full-chain technical services. This not only solves farmers' technical problems and opens up the "last mile" of scientific and technological achievement transformation but also cultivates high-level applied talents with deep sentiments for agriculture, rural areas, and farmers, achieving a perfect coupling of talent training, technological innovation, and social service [4].

5.3. "Industrial Village Head" and "Rural CEO" Model: Management Talent Empowering Collective Economy

5.3.1. Model Connotation and Logic

The landing of new quality productive forces in rural areas requires modern management. Traditional village cadres often lack market-oriented operation capabilities. Therefore, recruit "Industrial Village Heads" or "Rural CEOs" through market-based mechanisms to operate strong village companies and new rural collective economic organizations.

5.3.2. Operation Mechanism

The government issues guidance opinions and salary subsidy policies to recruit professional talents with experience in cultural tourism operation, e-commerce live streaming, and brand planning nationwide. Grant Rural CEOs management rights and implement a compensation system of "Basic Salary + Performance Dividend." Through their professional operation, transform ecological resources (lucid waters and lush mountains) into high-value-added tourism products and ecological agricultural products (gold and silver mountains), driving villagers to increase income and talent to return [5].

5.4. "Vocational Education City + Industrial Park" Dual-Core Drive Model: City-Industry-Education Integrated Development

5.4.1. Model Connotation and Logic

Utilize the unique advantage of Qingyuan as the location of the Guangdong Provincial Vocational Education City to promote the deep integration of physical space and functional space between the Vocational Education City, Qingyuan High-tech Zone, and various county industrial parks.

5.4.2. Operation Mechanism

Establish a mechanism where "Parks set questions, Colleges answer questions." Park enterprises release "lists" of technical needs, and colleges form interdisciplinary teams to "reveal the list and take command." Encourage vocational colleges to establish secondary colleges or industrial colleges in industrial parks, and enterprises to establish productive training workshops on campuses. Through the physical embedding of "School in Factory, Factory in School," achieve resonance between the supply side of talent training and the demand side of industry [6].

6. Countermeasures, Suggestions, and Outlook

6.1. Policy Suggestions

6.1.1. Strengthen Top-level Design and Compile Special Plans for Industry-Talent Integration

It is suggested that local governments of ecological functional areas include industry-talent integration in the preliminary research of the "15th Five-Year Plan." Compile the "Blueprint for Talent Development of New Quality Productive Forces," clarifying key industrial fields and catalogs of urgently needed scarce talents for the next 5-10 years, achieving synchronous compilation and implementation of industrial planning and talent planning.

6.1.2. Innovate Evaluation Systems and Break the Tendency of "Only Education and Titles"

Establish a talent evaluation system oriented by innovation

value, ability, and contribution. For skilled talents and local talents who have made outstanding contributions in the field of new quality productive forces, education restrictions can be broken to directly recognize high-level talent qualifications. Explore the establishment of a talent credit value system, transforming talent innovation credit into financial credit limits (e.g., "Talent Loan").

6.1.3. Establish Special Funds to Increase Guarantee for Industry-Talent Synergy Investment

Integrate fiscal funds at all levels to establish a "New Quality Productive Forces Industry-Talent Integration Development Guidance Fund." Focus on supporting talent entrepreneurship projects, scientific and technological achievement transformation projects, and public technology platform construction. Leverage fiscal funds to mobilize social capital to participate in talent investment, forming a diversified investment mechanism.

6.1.4. Deepen Guang-Qing Integration and Build a Regional Talent Community

Relying on the Guang-Qing counterpart assistance mechanism, promote mutual recognition of talent qualifications and interoperability of social security and medical insurance between the two places. Establish a "Dual Employment System" for high-level talents, encouraging experts from Guangzhou universities and research institutes to work part-time in Qingyuan. Share high-end training resources of the Greater Bay Area, and regularly organize cadres and entrepreneurs from ecological functional areas to learn in the Bay Area to improve their modernization construction capabilities [7].

6.2. Conclusion

Developing new quality productive forces in ecological functional areas is both a profound transformation of production methods and a systematic reshaping of talent mechanisms. Under the grand narrative of the "Hundreds, Thousands, and Ten Thousands Project," only by breaking traditional path dependence and establishing a collaborative mechanism of deep coupling and benign interaction between industry and talent can ecological advantages truly be transformed into development advantages.

Explorations in Northern Guangdong regions like Qingyuan show that through models such as "Reverse Enclave" brain borrowing, "Science and Technology Backyard" rooting, and "Vocational Education Integration" talent cultivation, it is entirely possible to forge a differentiated path for developing new quality productive forces in underdeveloped areas. In the future, as digital technology breaks time and space constraints and people return to the pursuit of ecologically livable environments, ecological functional areas are expected to become "habitats" for a new round of high-quality talents and a "new blue ocean" for innovation and entrepreneurship. We look forward to continuous institutional innovation and environmental optimization, allowing all kinds of talents to race in the lucid waters and lush mountains, jointly painting a new picture of modernization where humanity and nature coexist harmoniously.

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