

Strategic Coupling Perspective on Rural Indigenous Talent Cultivation in Hainan Free Trade Port: Mechanisms, Failures, and Reconstruction

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Abstract: Against the backdrop of the in-depth development of the Hainan Free Trade Port (FTP), the supporting role of rural indigenous talents directly affects the full penetration of strategic dividends. This paper introduces the economic geography theory of “strategic coupling” to construct a three-dimensional analytical framework of “strategy–industry–talent” and a three-stage dynamic model of “transmission–reorganization–restructuring.” Based on 413 provincial questionnaires and in-depth case studies of three typical regions (high-tech strategic radiation, traditional industry transformation, and modern service industry radiation), this study systematically diagnoses the structural dilemmas in current rural indigenous talent cultivation. The findings reveal a significant structural decoupling and functional misalignment between the FTP’s exogenous strategic thrust and the endogenous rural development foundation. Specifically, these manifest as institutional obstruction and spatial disembedding during the policy transmission stage, industry supply–demand mismatch during the resource reorganization stage, and weakened cultural identity alongside social capital dissipation during the ecological restructuring stage. To address these issues, the research breaks free from linear cultivation thinking and proposes an empowering indigenous talent cultivation ecosystem based on precise classification, policy coordination, deep industry–education integration, digital technology, and the revitalization of local values. This ecosystem aims to repair the full-process coupling failures and provide a systematic path reference for rural talent revitalization in the FTP context.

Keywords: Hainan Free Trade Port; Rural Indigenous Talents; Strategic Coupling;

Coupling Failure; Empowering Ecosystem

1. Introduction

The issuance of the Guiding Opinions on Supporting Hainan’s Comprehensive Deepening of Reform and Opening-up in 2018 and the Overall Plan for the Construction of Hainan Free Trade Port in 2020 marked Hainan’s mission to lead the new era of opening-up. According to the 2025 Hainan Provincial National Economic and Social Development Statistical Bulletin, by the end of 2025, Hainan FTP’s total import and export of goods reached 276.003 billion yuan, and its actual utilized foreign capital for the year was 25.1 billion yuan, a year-on-year increase of 19.9%, maintaining double-digit growth for five consecutive years. The strategic momentum of the FTP is accelerating its transformation into high-quality development momentum. However, the spatial distribution of this development dividend is highly uneven, concentrating in coastal key industrial parks. As a province-wide national strategy, the dividends of FTP construction must effectively radiate to the vast rural hinterland, which accounts for 85% of the province’s land area and 42% of its permanent population. In this process, the flow, cultivation, and growth of talents serve as the core active link connecting macro-strategic visions with micro-development practices.

Existing research on the FTP has mostly focused on international high-end talent introduction policies or macro-level human resource strategies [1]. In contrast, the endogenous cultivation and adaptive transformation of indigenous talents—those rooted in the countryside and underpinning rural development—have received relatively little academic attention. It is precisely this group, which carries local knowledge, works on the front lines of industries, and sustains rural cultural heritage [2], whose capabilities and development concepts directly determine whether the FTP’s institutional dividends can be

effectively delivered to rural areas and whether urban–rural integration can achieve deep synergy. Therefore, in the high-level open policy laboratory of Hainan FTP, how to effectively cultivate and activate rural indigenous talents so that they can not only adapt to the wave of change but also actively shape new forms of rural development has become an important issue to be solved. This study adopts the “strategic coupling” analytical framework to analyze practical dilemmas, extract underlying logic, and propose localized and systematic cultivation paths, thereby providing academic support for the practice of rural talent revitalization.

2. Literature Review and Theoretical Framework

2.1 Review of Existing Research

Domestic and international research on free trade ports (zones) and rural development shows a clear disciplinary divide. International research started earlier, focusing initially on quantitative analysis of the economic benefits and employment creation of free trade zones. Subsequent studies have examined spillover effects on regional skill structures (e.g., case studies of Singapore and Dubai), but in-depth research specifically on human resource cultivation penetrating rural hinterlands remains scarce. Kanbur and Venables (2005) pointed out that globalization, without effective localization adjustment mechanisms, can widen the urban–rural skills gap [3]—a judgment highly consistent with Hainan’s reality.

Domestic research on rural talent revitalization has produced rich results, mainly focusing on describing development dilemmas [4], analyzing the mechanisms of human capital [5], and exploring cultivation paths from the perspectives of vocational education and cultural identity [6]. However, there is a clear research gap: the systematic study of rural indigenous talent development within the context of the FTP as a high-energy open platform has not been conducted. Existing research either emphasizes macro-strategic planning or is confined to conventional rural contexts, failing to fully reveal the complex and dynamic interaction mechanism between the FTP’s special policy environment and the rural indigenous talent system. This research gap is the core direction of this study and the key motivation for introducing

the “strategic coupling” theory.

2.2 Theoretical Framework: Introduction and Expansion of the “Strategic Coupling” Perspective

The theory of “strategic coupling” originated from the global production networks paradigm, first proposed by Coe, Dicken, and Hess (2004) [7] and subsequently refined by scholars such as Yeung (2016) [8]. The core idea is that regional development actors, through proactive strategic choices and organizational restructuring, dynamically link their own endowments with externally mobile strategic resources such as capital, technology, and knowledge, thereby seizing development opportunities in global/regional value chains.

Distinct from the spatial agglomeration perspective of new economic geography and the path dependence perspective of new institutional economics, the “strategic coupling” theory focuses on two cores: strategy and coupling mechanism. Its theoretical connotation includes three key dimensions:

- 1). Reciprocity and dynamism: Coupling is not one-way passive embedding but a process of mutual interaction and support between external strategic forces and regional endogenous assets. It evolves dynamically with changes in the external environment, experiencing stages such as mutual benefit, decoupling, etc.
- 2). Actor agency: Micro-actors within the region, such as enterprises, labor, and local institutions, are not passive recipients but have agency for active learning, innovation, and networking. They can adjust themselves to adapt to external strategies and optimize their position in value chains.
- 3). Multi-scalar interaction: Coupling involves interactions across multiple scales—global, national, regional, and local. The implementation of macro strategies relies on the reception and transformation of local micro-systems.

This study extends this economic geography theory across disciplines to analyze the interaction between the national macro-strategy (Hainan FTP) and the local micro-system (rural talent ecosystem). This theoretical migration is highly appropriate: Hainan FTP is not only a geographical space but also a strategic node driven by policies and converging global factors; the rural indigenous talent system is an endogenous development base deeply embedded

in local geography, history, and socio-cultural networks.

Within this framework, the core meaning of “coupling” is as follows: the policy dividends, capital injection, and opening-up opportunities generated by FTP construction form a strong exogenous strategic thrust, transmitting energy to the rural field; rural indigenous talents must exert their agency to complete deep adaptive changes and creative transformations in knowledge structure, skill systems, values, and social capital, so as to efficiently receive and regenerate externally input energy. The coupling between the two is by no means a simple policy “blood transfusion,” but rather a dynamic process involving friction, adaptation, and

synergy. Once exogenous driving forces fail to align with endogenous foundations, coupling failure and decoupling risks may emerge. This framework provides a unique theoretical perspective for analyzing the challenges in rural talent development in Hainan.

2.3 Three-Stage Coupling Model

To operationalize the theoretical analysis, this study, combined with practical investigations in multiple areas of Hainan, decomposes the “strategic coupling” process into a three-stage dynamic model of transmission–reorganization–restructuring (Figure 1).

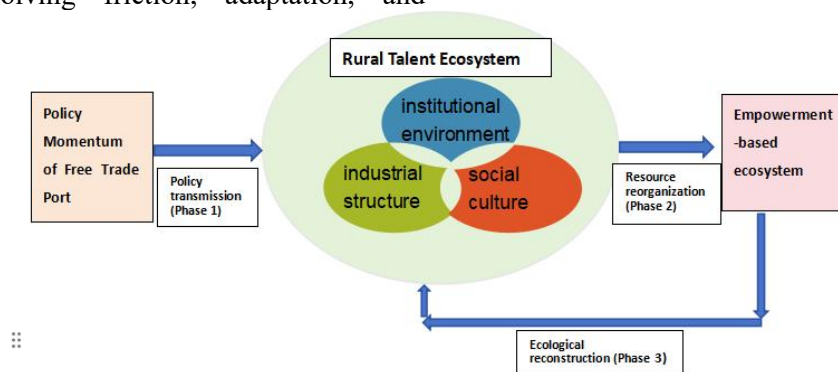


Figure 1. Strategic Coupling of the Three-Phase Dynamic Model "Conduction-Reorganization-Reconfiguration"

- Policy Transmission Stage: Focuses on the entire process of FTP macro-policies (tax incentives, investment facilitation, cross-border data flow, etc.) penetrating the countryside. This stage is susceptible to bureaucratic inertia and urban–rural dualistic thinking, leading to policy suspension and effect attenuation.

- Resource Reorganization Stage: A critical period when the rural system (industry, education, social organizations, etc.) identifies, screens, absorbs, and reallocates external policy momentum. This is the core link where old and new resources, ideas, and models collide and merge, directly determining whether external momentum can be transformed into endogenous driving force.

- Ecological Restructuring Stage: After interactive adjustments in the previous two stages, a more adaptive talent cultivation and utilization ecosystem is ultimately formed, achieving a fundamental shift from external “blood transfusion” to self “hematopoiesis.”

2.4 Research Methods

This study adopts a mixed-methods approach

combining quantitative and qualitative research. Quantitatively, 413 questionnaires were distributed across 18 cities and counties in Hainan Province. Data were analyzed using SPSS 26.0, with good reliability and validity (KMO=0.82, $\alpha=0.85$). Qualitatively, based on three criteria—FTP policy coverage, rural industrial characteristics, and innovation in rural indigenous talent policies—three typical regions were selected for in-depth case studies: Sanya Yazhou Bay Science and Technology City (surrounding villages of the Nanfan Silicon Valley), representing the high-tech strategic radiation type, to analyze the coupling dilemma between the national seed industry strategy and local agrotechnical talents; Wanning Zhugancun Village (a betel nut processing specialized village), representing the traditional industry transformation type, to examine structural misalignment in industry–education integration; and Qionghai Boao and surrounding areas (cultural tourism integration type), representing the modern service industry radiation type, to explore the demand and cultivation pain points of new rural business formats for skilled talents.

3. Analysis of Coupling Failure Based on the Three-Stage Model

There is a significant tension between the strategic blueprint of Hainan FTP and the actual situation of rural indigenous talent development. This tension is essentially a manifestation of “strategic coupling” failures across the three dimensions of policy, industry, and socio-culture at each stage, hiding deep institutional and structural roots. The following typical cases clearly present the specific characteristics of coupling failure at each stage.

3.1 Policy Transmission Stage: Institutional Obstruction and “Spatial Disembedding”

3.1.1 Insufficient policy coordination leading to structural decoupling

The top-level design of the FTP is forward-looking, but when it comes to rural indigenous talents, related policies show fragmentation. Among 47 reviewed agricultural talent policy documents, they are under the jurisdiction of five or more departments (agriculture, human resources, education, etc.), and only 12 documents explicitly establish cross-departmental coordination mechanisms. For example, the “Tianya Yingcai Card” policy for high-end scarce talents lacks effective connection with the cultivation policies for local “soil experts” and “field talents.” Although the cross-border data flow facilitation policy has boosted e-commerce growth across the province, a survey in Tanmen Town, Qionghai, shows that due to a lack of compliance operation talents, only 23% of rural e-commerce small and micro entities can actually enjoy the policy dividends.

3.1.2 Obstruction of exogenous strategic dividend penetration: spatial disembedding and attenuation effect

Sanya Yazhou Bay Science and Technology City, as a national “Nanfan Silicon Valley,” gathers top seed industry research resources and huge R&D investments, making it one of the areas with the most concentrated strategic momentum of the FTP. However, the survey shows that rural indigenous talents in the surrounding villages have failed to effectively receive this high-end momentum: local farmers still focus on traditional land leasing and basic labor, lacking core skills such as seed production technicians and seed breeders; research institutions urgently need a large number of field technical assistants, but local training remains at

the level of conventional tropical crop cultivation, failing to meet the special skill needs of the Nanfan industrial chain. This phenomenon indicates a rupture in the transmission of the high-end national strategy (seed industry revitalization) of the FTP to the “last mile” of the countryside, resulting in an awkward situation where a “science highland” coexists with a “talent lowland.” Essentially, the exogenous policy thrust has not effectively coupled with the endogenous administrative structure, leading to transmission failure.

3.2 Resource Reorganization Stage: Industrial Supply–Demand Mismatch and Functional Dysfunction

Entering the resource reorganization stage, the contradiction between the rapidly iterating industrial talent demand and the rigid supply system causes serious functional dysfunction. The FTP construction is accelerating the transformation of rural industries towards high value-added and new business formats, with surging demand for organic agriculture certifiers, rural cultural tourism planners, cross-border e-commerce talents, etc. However, the transformation of the rural labor force’s skill structure in Hainan is severely lagging. One-way ANOVA of questionnaire data shows that the mean demand for new skills for innovative and entrepreneurial talents ($M=4.52$) is significantly higher than that for traditional production and operation talents ($M=2.95$), confirming that the “blanket” training approach has completely failed.

Wanning Zhugancun Village, as a betel nut processing specialized village, is undergoing a transformation from traditional primary processing to standardization and branding, driven by the FTP’s improved food safety standards and expanded market demand for deep-processed products. Enterprises urgently need talents with composite skills in food processing technology, quality inspection, and e-commerce marketing, but the local labor supply shows a clear skill gap: middle-aged and elderly workers stick to traditional slicing and drying techniques, while young people prefer to work outside the village or engage in low-threshold service industries. At the same time, educational supply is seriously lagging: local partner vocational colleges adjust their majors slowly, with curricula still focused on traditional planting and lacking practical training

in betel nut deep processing and food safety; food engineers recruited from other provinces with high salaries suffer from “non-acclimatization” in product development because they are unfamiliar with local betel nut varieties and processing traditions. This case profoundly reveals that the structural mismatch between educational resource supply and the upgrading needs of local characteristic industries prevents external capital and technology from taking root locally.

3.3 Ecological Restructuring Stage: Weak Foundation and Socio-Cultural Identity Crisis

The success of ecological restructuring depends on a solid socio-cultural foundation, but currently, rural Hainan is facing an implicit crisis of cultural identity. Under the impact of marketization and urbanization, traditional social networks centered on blood and geography are gradually loosening. More deeply, there is a value disembedding, where individual development concepts detach from the rural socio-cultural matrix. Data show that 68.5% of rural youth aged 18–35 prefer to settle in cities, and this “leaving the land” mentality directly leads to a generational gap in the rural talent echelon. In some rural tourism demonstration sites in Qionghai, hardware facilities have been greatly improved through “beautiful village” construction, but the operators and employees of new businesses such as homestays and coffee shops are mostly outsiders and external capital, while local villagers only hold basic positions such as cleaning and security, remaining at the bottom of the industrial chain. A village cadre interviewed said, “The village has become beautiful, but the hearts of the young people have not returned.” The core problem is that the cultural tourism integration policy has not activated local cultural identity: high-quality cultural resources such as Li and Miao culture, fishing culture, and overseas Chinese culture have not been transformed into marketable tourism products, and local villagers lack the ability to convert cultural capital into economic capital. In contrast to Sichuan, Yunnan, and other places that have built strong talent “magnets” based on ethnic culture, Hainan’s cultural resources are mostly statically displayed, not embedded in the dynamic process of talent cultivation, making it difficult to form cultural appeal. As a result, the rural talent ecosystem

lacks endogenous cohesion, and the trend of talent outflow is hard to reverse.

4. Construction Path of an Empowering Rural Indigenous Talent Cultivation Ecosystem

In response to the three-stage coupling failure problems, this study proposes the construction of an organically interactive and dynamically evolving empowering indigenous talent cultivation ecosystem. The path design strictly follows the logic of “transmission–reorganization–restructuring” to repair the coupling mechanism and achieve a qualitative leap from passive reception to active integration.

4.1 For the Policy Transmission Stage: Cross-Sectoral Coordination and Digital Governance Closed Loop

4.1.1 Establish a high-level overall policy coordination network, implement talent service specialists and policy direct access

To solve the institutional obstruction in policy transmission, an integrated coordination mechanism should be built. At the provincial level, establish a multi-department joint meeting system for rural talent development, formulate the Hainan FTP Rural Talent Development Action Plan, conditionally extend the tax incentives for FTP encouraged industries to rural small and micro enterprises, and promote the shift from fragmented to integrated policies. At the grassroots level, fully implement the “talent service specialist” system to ensure precise delivery of policy dividends to the “last mile.” In response to the “policy attenuation” problem in the Yazhou Bay Nanfan Silicon Valley, it is recommended to set up dedicated talent service specialists in townships around key industrial parks, match the demand of research institutions with the local labor supply, regularly release the “Nanfan employment skills list,” and accurately allocate training funds to training institutions that adapt to the Nanfan industrial chain, thus unblocking the policy implementation bottlenecks.

4.1.2 Build a digital platform to create a dynamic monitoring and feedback system

Digitalization is a key means to break through bureaucratic barriers. Integrate resources across the province to build the “Hainan Rural Talent Digital Learning Hub.” Relying on artificial intelligence, customize personalized growth

paths for talents. Drawing on the experience of digital training for “Shanlan wine” in Qiongzong Li Autonomous County, develop VR/AR training courses for the whole province, such as the “intelligent rubber tapping simulation system,” to reduce the cost and risk of physical training, allowing farmers in remote mountainous areas to receive expert guidance via mobile phones, thereby enhancing digital literacy and lifelong learning ability. At the same time, establish a “Rural Talent Development Index” covering talent scale, structure, literacy, and development environment, use big data to warn of talent supply–demand gaps, and form a governance closed loop of “monitoring–evaluation–feedback–optimization,” accurately capturing attenuation points in policy transmission and providing data support for dynamic policy adjustment.

4.2 For the Resource Reorganization Stage: Precise Classification and Deep Industry–Education Integration

4.2.1 Implement precise classification training based on industrial scenarios

To solve the supply–demand mismatch, the extensive model of large-scale supply must be abandoned. Based on industrial scenarios, classify indigenous talents into four types: production and operation type, professional skill type, governance and service type, and innovative and entrepreneurial type, and implement “one category, one policy” precise cultivation:

- Production and operation talents (family farm owners, cooperative leaders): Focus on imparting knowledge of smart agriculture, green standards, brand management, and supply chain finance, promoting transformation into “agricultural managers.” Take the example of the Chengmai Qiaotou sweet potato industry: cultivate farmers as “brand partners” rather than mere growers.

- Professional skill talents (homestay butlers, e-commerce anchors, rural craftsmen): Implement the “vocational certification + on-the-job training” model, introducing advanced industry standards. For the homestay industry in Qionghai Boao, build a “homestay butler” certification system that incorporates high-level skills such as cross-cultural communication, Hainan intangible cultural heritage explanation, and crisis public relations,

transforming traditional farmers into “new farmers” and “professional managers.”

- Governance and service talents (village cadres, cultural inheritors): Focus on improving the modernization level of grassroots governance, community building capabilities, and live inheritance of intangible cultural heritage.

- Innovative and entrepreneurial talents (returned youth, veterans): Focus on high-level training in cross-border e-commerce, foreign-related law, etc., building a full-cycle service system from incubation to market connection.

4.2.2 Build a deep industry–education integration mechanism closely linked to the industrial chain

To solve the disconnection between education and industry, the education chain and industrial chain must be deeply embedded. At the county level, universities, vocational colleges, and leading enterprises jointly build “Rural Revitalization Industry Colleges” with a council co-governance system. Promote the experience of the “Tropical Fruit Industry College” jointly built by Wanning City and Hainan College of Vocation and Technique. For the processing transformation needs of the main betel nut producing areas, the government should take the lead, unite leading enterprises and provincial vocational colleges to establish a “Betel Nut Deep Processing Industry College,” customize special courses according to industrial needs, and achieve “learning by doing and creating while learning.” Enterprises participate in enrollment and curriculum design through “order classes,” turning production lines into training classrooms, realizing “entry to school equals entry to enterprise, graduation equals employment.” At the same time, leveraging the advantages of cross-border data flow in the FTP, introduce international advanced agricultural vocational standards and digital education resources to enhance the international adaptability of talent cultivation.

4.3 For the Ecological Restructuring Stage: Revitalizing Local Values and Open Evaluation

4.3.1 Revitalize local cultural values and broaden international perspectives

To repair the cultural identity crisis, a “Local Cultural Value Revitalization Plan” should be implemented, deeply integrating local knowledge such as Li and Miao culture and marine culture into the entire talent cultivation

process. Drawing on the model of the “Li Brocade Cultural Heritage Base” in Sanya Yazhou Bay, activate traditional skills with “culture + tourism + e-commerce,” enhancing talents’ cultural confidence and sense of belonging. Relying on the FTP’s open platform, build a “Rural International Intellectual Circulation” network to introduce international intellectual resources and broaden the global vision of local talents.

Promote the upgrading of talent cultivation at the Wen-chang “Cross-Strait Agricultural Cooperation Experimental Zone.” Learn from the mature experience of Taiwan’s precision agriculture and leisure agriculture, establish a regular talent exchange mechanism; select young rural backbone talents from Hainan to go to Taiwan and Singapore for immersive study tours in community building and organic farming, simultaneously learning techniques, community governance, and cultural revitalization experiences; invite tropical agriculture experts from Southeast Asia to Hainan for short-term technical guidance, promoting the localization and transformation of international experience, and cultivating a rural indigenous talent team with international competitiveness.

4.3.2 Innovate a contribution-oriented evaluation mechanism

To restructure the talent ecosystem, the evaluation “baton” needs reform. Based on the FTP policy framework, pilot the inclusion of actual economic contribution, skill innovation, employment driving, and cultural inheritance into the evaluation system for rural indigenous talents, giving priority allocation of resources such as rural collective construction land and idle homesteads to outstanding local talents. Promote the practice of Baisha Li Autonomous County of including e-commerce performance in professional title evaluation, raising the social status of “soil experts” and using resource leverage to stimulate endogenous motivation, achieving “promoting cultivation through evaluation.”

5. Conclusion

The construction of Hainan FTP has injected unprecedented strategic momentum into rural development, while also imposing higher demands on the rural indigenous talent cultivation system. This study introduces the strategic coupling theory and a three-stage

dynamic model, and through case analyses of Yazhou Bay, Wanning Zhugancun Village, and Qionghai Boao, reveals the current dilemmas in rural indigenous talent cultivation: insufficient institutional coordination, industrial supply–demand mismatch, and weakened cultural identity. These are essentially failures in all stages of coupling—transmission, reorganization, and restructuring. To address this, the empowering rural indigenous talent cultivation ecosystem constructed in this study, with core elements of precise classification, deep industry–education integration, digital governance closed loop, and dual empowerment of local values and international vision, forms a systematic solution to repair the coupling mechanism. Only then can the “coupling failure” predicament be broken through, and in the open tide of the FTP, an endogenous talent team rooted in the countryside and connected to the world be cultivated, injecting lasting and fresh endogenous momentum into the comprehensive revitalization of Hainan’s rural areas.

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