

# **Dilemma and Breakthrough of Industry-Education Integration in Rural Vocational Education from the Perspective of "Industrial Chain-Talent Chain" Matching**

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**Abstract:** Industrial revitalization is the core support for the implementation of the rural revitalization strategy, and the supply of high-quality skilled talents in rural areas is the key to industrial revitalization. As the main position for talent cultivation rooted in rural areas and serving county-level regions, rural vocational education relies on industry-education integration as the core grip to achieve precise matching of the "industrial chain-talent chain" and solve the mismatch between talent supply and demand. Adopting the methods of literature research and field investigation, this paper takes the matching of "industrial chain-talent chain" as the core research perspective, systematically defines the core connotations of rural vocational education, industry-education integration and dual-chain matching, deeply sorts out the internal theoretical logic of dual-chain collaborative education, and accurately analyzes the practical dilemmas of current industry-education integration such as the mismatch between industrial chain and talent chain supply and demand, the fault of collaborative mechanism, insufficient resource support and lagging evaluation system based on the actual running of county-level rural vocational education. It puts forward targeted breakthrough paths from four dimensions: dynamic adaptation of majors, reconstruction of education mode, improvement of collaborative mechanism and perfection of guarantee system, aiming to promote the resonance between talent cultivation of rural vocational education and rural industrial development, effectively enhance the practical efficiency of vocational education in empowering rural industrial revitalization and talent revitalization, and help the full implementation of rural revitalization.

**Keywords:** Rural Revitalization; Rural Vocational Education; Industry-Education Integration; Industrial Chain; Talent Chain; Dual-Chain Matching

## **1. Introduction**

With the deepening of the rural revitalization strategy and the accelerated high-quality development of rural industries, rural industrial forms have gradually shifted from traditional single planting and breeding to diversified new business models such as smart agriculture, deep processing of agricultural products, rural e-commerce, agro-tourism integration, rural health care, and intangible cultural heritage creation. Industrial chains are extending upstream and downstream with continuously increasing added value, leading to explosive growth in demand for skilled, compound, and localized practical rural talents, and job skill requirements are becoming increasingly refined and specialized. As a core carrier of talent cultivation rooted in counties, close to rural areas, and oriented towards farmers, rural vocational education shoulders the important mission of bridging the "last mile" between talent supply and industrial demand. The integration of industry and education, as the core school-running model of modern vocational education, is a key path to effectively connecting and mutually empowering the education chain, talent chain, industry chain, and innovation chain.

In recent years, China has successively issued policy documents such as the Opinions on Deepening the Reform of the Modern Vocational Education System, the Opinions on Accelerating the Revitalization of Rural Talents, explicitly requiring rural vocational education to deepen the integration of industry and education, school-enterprise cooperation, focus on cultivating localized skilled talents for rural characteristic industries, and consolidate the talent foundation for rural revitalization.

However, from the perspective of school-running practices in Chinese counties, the integration of industry and education in rural vocational education still generally remains at the primary stage of "shallow cooperation and superficial integration." Prominent issues include the disconnection between talent cultivation and job demands in rural industrial chains, school-enterprise collaboration being reduced to formalism, and unsatisfactory educational outcomes [1-3]. The mismatch degree between rural vocational education programs in counties and local rural leading industrial chains is high, and structural contradictions in talent supply are prominent. The root cause of this series of problems lies in the fact that the precise matching mechanism between the "industry chain" and the "talent chain" has not been established and improved. The root cause of these issues lies in the lack of a sound mechanism for precise matching between the "industry chain" and the "talent chain." Based on this, this paper cuts into the issue from the perspective of dual-chain matching, deeply addresses the practical bottlenecks in the integration of industry and education in rural vocational education, and explores efficient collaborative optimization paths for talent cultivation, which has important theoretical value and practical guiding significance for improving the quality of rural vocational education, activating rural talent dynamics, and empowering rural industrial revitalization.

## **2. Definition of Core Concepts and Theoretical Logic of Dual-Chain Matching**

### **2.1 Definition of Core Concepts**

#### **(1) Rural Vocational Education**

Rural vocational education is a type of vocational education rooted in county-level rural development, oriented towards rural areas, agriculture, and farmers, with the core mission of cultivating practical rural skills talents, inheriting local techniques, and serving rural industrial upgrading. It encompasses diverse school-running entities such as county-level secondary vocational schools, agriculture-related higher vocational colleges, rural adult cultural and technical schools, new-type professional farmer training bases, and township skill training stations. It features four core attributes: professionalism, locality, public welfare, and

practicality. It serves as a key link connecting rural education development and industrial revitalization, facilitating the flow of urban and rural vocational education resources downward, and is the main front for cultivating new-type professional farmers and rural craftsmen [4].

#### **(2) Integration of Industry and Education**

The integration of industry and education in rural vocational education refers to vocational colleges proactively connecting with market entities such as rural enterprises, agricultural cooperatives, family farms, village collective economic organizations, and local industrial parks. It breaks down physical and institutional barriers between campuses and fields, classrooms and workshops, and teaching and production, and deeply integrates industrial production processes, technological R&D achievements, on-the-job operation standards, and industry development trends with education, teaching, talent cultivation, skills training, and social services. This constructs a collaborative talent cultivation model of "promoting industry through education, supporting education through industry, integrating industry and education, and symbiosis between schools and enterprises." Unlike traditional school-enterprise cooperation, it emphasizes deep participation, benefit sharing, and shared rights and responsibilities [5].

#### **(3) Industry Chain-Talent Chain Matching**

An industry chain refers to the full-chain layout of rural characteristic industries, covering front-end production and planting, mid-end processing and storage, back-end circulation and sales, and end-consumption services, including core elements such as job levels, skill standards, and talent demand scales. A talent chain refers to the full-cycle system of talent cultivation, supply, growth, and promotion centered around job demands in various links of the industry chain. Dual-chain matching means that rural vocational education, guided by the development needs of rural industry chains, achieves precise alignment throughout the process of professional settings, curriculum systems, skill training, and evaluation standards with the job demands, skill standards, and development trends of various links in rural industry chains. It dynamically adjusts talent cultivation plans to ultimately realize dynamic adaptation, mutual empowerment, and closed-loop circulation between talent supply and industrial demand [6].

## **2.2 Theoretical Logic of Dual-Chain**

### **Matching**

The industry chain serves as the directional guide and demand source for talent chain cultivation, while the talent chain acts as the core support and kinetic guarantee for industry chain upgrading [7]. The two are interdependent, synergistic, and inseparable, aligning with the core construction requirement of "four-chain connection" in modern vocational education. On the one hand, the upgrading and iteration of the rural industrial chain directly determines the cultivation direction of the talent chain, and the emergence of new rural business forms, new posts and new skills forces rural vocational education to quickly adjust the major structure, update teaching content and optimize training links; on the other hand, the high-quality supply of the talent chain feeds back the quality and efficiency improvement of the industrial chain, and high-quality skilled talents and rural craftsmen can promote technological innovation, model innovation and brand upgrading of rural industries, and solve the talent bottleneck of rural industrial development. The core goal of industry-education integration in rural vocational education is to build an institutional bridge and practical platform for dual-chain connection, eliminate the information gap, standard gap and practice gap between talent cultivation and industrial demand through school-enterprise collaboration, industry-education interaction and resource sharing, and form a virtuous cycle ecosystem of "industry putting forward demands, colleges cultivating talents, talents promoting industries, and industries feeding back education".

### **3. Practical Dilemmas in the Integration of Industry and Education in Rural Vocational Education under Dual-Chain Mismatch**

Currently, the integration of industry and education in rural vocational education fails to achieve deep coupling of dual chains, with the core contradiction being systematic mismatch between talent supply structure and industrial demand structure. Bottlenecks and difficulties in school-running practices overlap, manifesting in four prominent issues.

#### **3.1 Mismatch between Professional Chains and Industry Chains: Disconnection between Talent Supply and Industrial Demand**

Rural industry chains have transformed towards diversification, integration, and digitalization,

but higher education institutions and vocational colleges still adhere to traditional disciplinary models in program offerings, with their adjustment pace lagging significantly behind industrial upgrading trends [8]. On the one hand, homogeneous and outdated professional layouts are prominent. Most county-level vocational education centers still focus on basic agriculture-related majors such as traditional planting and breeding, leaving gaps or insufficient coverage for emerging rural business models like smart agriculture, cold chain logistics of agricultural products, rural e-commerce live streaming, agro-tourism planning, intangible cultural heritage creation, and rural health care nursing. This directly leads to a continuous expansion of talent supply gaps in emerging industries. On the other hand, rigid and ineffective dynamic adjustment mechanisms for majors exist. Colleges lack regular rural industry chain research mechanisms, and professional settings are often guided by internal faculty reserves and existing school-running conditions rather than local rural industrial job demands. This results in structural contradictions such as oversupply of traditional professionals and shortage of emerging professionals. Meanwhile, curriculum systems are seriously disconnected from job skill standards, with outdated textbook content and singular teaching methods. There is a common problem of emphasizing theoretical indoctrination over practical operations, leading to significant gaps between students' skills acquired in school and the practical operation requirements of industry chain jobs, making it difficult for graduates to quickly adapt to job demands after graduation.

#### **3.2 Disconnection between Talent Cultivation Chains and Job Chains: Formalistic Integration of Industry and Education**

The integration of industry and education in rural vocational education generally faces the realistic dilemma of "cooperation without integration, integration without depth, and enthusiasm from schools but not enterprises," with a complete separation between the entire talent cultivation process and industrial job practices [9]. First, the level of school-enterprise cooperation is shallow. Most collaborations only stay at surface-level activities such as enterprise visits, short-term internships, and expert lectures. Enterprises rarely deeply participate in core talent cultivation links such as formulating talent

cultivation plans, developing core courses, designing practical training teaching, and evaluating student performance. School-enterprise collaborative talent cultivation becomes a mere formality. Second, practical training bases are scarce and underutilized. County-level rural enterprises are generally small-scale and economically weak, making it difficult to build standardized and large-scale training platforms. On-campus practical training equipment in colleges is outdated, with insufficient real training scenarios aligned with industrial realities, depriving students of immersive job experience opportunities. Third, there is a shortage and structural imbalance of "double-qualified" teaching staff. Most rural vocational education teachers are theoretical talents graduated from ordinary universities, lacking first-line practical experience and project operation experience in rural industries. Externally hired industrial mentors and rural craftsmen have high mobility and low teaching participation, making it difficult to support high-quality practical teaching and skill transmission.

### **3.3 Disconnection between Collaborative Chains and Operational Chains: Ambiguous Rights and Responsibilities among Multiple Subjects**

The integration of industry and education in rural vocational education involves multiple participants such as education, agriculture and rural affairs, human resources and social security, finance, township governments, vocational colleges, rural enterprises, and village collectives. However, cross-departmental and cross-subject collaborative operation mechanisms are not yet sound, with ambiguous division of rights and responsibilities [10]. First, insufficient departmental collaboration and scattered resources. The education department focuses on college management, the agriculture and rural affairs department on industrial development promotion, and the human resources and social security department on skill level certification. Policies among departments are poorly connected, resource coordination is ineffective, and there is a lack of regular joint consultation mechanisms, making it difficult to form a talent cultivation synergy. Second, unequal rights and responsibilities and imbalanced interests between schools and enterprises. Rural enterprises participating in the integration of industry and education need to invest in venues,

equipment, and personnel, but lack corresponding policy incentives and benefit guarantees, resulting in insufficient initiative and enthusiasm for participation. The model of unilateral dominance by colleges in talent cultivation is difficult to meet the actual needs of industries. Third, weak county-level overall planning. Rural vocational education is mostly self-managed by colleges, lacking top-level planning and overall layout at the county level. Regional and shared industry-education integration collaborative talent cultivation platforms have not been built based on local rural characteristic industry chains, leading to coexisting problems of resource waste and supply-demand mismatch.

### **3.4 Absence of Guarantee Chains and Evaluation Chains: Lack of Long-Term Support for Dual-Chain Matching**

On the one hand, the guarantee system is imperfect and policy implementation is difficult. The total investment in rural vocational education funds is insufficient and structurally single, with huge funding gaps in core links such as updating practical training equipment, teacher training, and carrying out school-enterprise cooperation. Preferential policies for rural enterprises, such as tax reductions, financial subsidies, and honorary incentives, are difficult to implement at the county level, further weakening the motivation of enterprises to participate. Special policies for local talent cultivation and graduate return employment are not targeted enough, and the mechanism for retaining localized talents is missing, leading to serious brain drain. On the other hand, the evaluation system is lagging and rigid. Talent cultivation evaluation still mainly relies on theoretical exams and on-campus written tests, without introducing core indicators such as industrial job standards, enterprise practical evaluations, and skill level certifications. The evaluation of the effectiveness of industry-education integration lacks quantitative assessment standards, emphasizing formal ledgers over actual results. This neither forces colleges to actively optimize talent cultivation models nor effectively incentivizes enterprises to deeply participate in collaborative talent cultivation, resulting in a lack of long-term institutional guarantees for dual-chain matching.

## **4. Breakthrough Paths for the Integration of**

### **Industry and Education in Rural Vocational Education from the Perspective of Dual-Chain Matching**

To resolve the dilemmas in the integration of industry and education in rural vocational education and achieve precise dual-chain matching, the core is to build a four-in-one collaborative system of "industry chain traction, talent chain support, industry-education chain integration, and guarantee chain escort." This promotes the transformation of dual chains from "mismatch and disconnection" to "precise adaptation" and "dynamic symbiosis." Specific practical paths are as follows:

#### **4.1 Anchoring Industry Chain Layout and Dynamically Reconstructing Professional Talent Chains**

Guided by the development needs of rural industry chains, establish a regular dynamic professional adjustment mechanism to achieve synchronous resonance and upgrading between professional chains and industry chains. First, carry out full-process industrial research and mapping. Form a special research team jointly with the agriculture and rural affairs department, township governments, industry associations, and leading rural enterprises to deeply sort out the job distribution, skill requirements, and talent gap scales of county-level rural leading industry chains and emerging business models, forming a precise and dynamic industrial talent demand list to provide data support for professional adjustments. Second, optimize the professional layout structure. Resolutely eliminate redundant majors completely disconnected from industrial development, integrate homogeneous and low-efficiency majors, and build characteristic agriculture-related professional clusters around key links of rural industry chains. Specifically add emerging majors such as smart agricultural technology, rural e-commerce operation, agro-tourism planning and design, rural health care, and agricultural product brand marketing to achieve a professional layout of "one county with one characteristic, one industry with one major, and one chain with one cluster." Third, reconstruct a curriculum system integrating positions, courses, competitions, and certificates. Fully integrate industry chain job skill standards, vocational skill level certificates, rural industry competition content, and local technique inheritance into curriculum modules, develop localized, practical,

and project-based school-based textbooks, and ensure that teaching content is fully aligned with industrial practical needs.

#### **4.2 Focusing on Job Chain Talent Cultivation and Deepening Full-Process Industry-Education Integration**

Completely break down physical and institutional barriers between campuses and industries, build a cultivation model of "school-enterprise collaboration, practice-led, and job empowerment," and promote deep connection between talent cultivation chains and job chains. First, build multiple shared practical training platforms. Vigorously promote the cooperation model of "colleges + enterprises + cooperatives + rural bases + industrial parks," jointly build off-campus practical training bases, rural industrial colleges, field skill workshops, and e-commerce live streaming training rooms, move classrooms directly to fields, production workshops, and e-commerce live streaming rooms, allowing students to practice skills and improve abilities in real job scenarios. Second, strengthen the team of "double-qualified" teachers combining full-time and part-time staff. Establish a rigid system for teachers' industrial practice, regularly arrange full-time teachers to take up posts and participate in project operations in rural enterprises, hire rural wealth leaders, industrial technical backbones, intangible cultural heritage inheritors, and rural craftsmen as part-time mentors, and form a stable teaching team. Third, innovate practical teaching models. Fully implement project-based, task-based, and modern apprenticeship teaching, carry out immersive teaching around real production projects, marketing projects, and service projects of rural industries, and achieve "learning by doing, doing by learning, and integration of learning and doing" to comprehensively improve students' job adaptability and practical skills.

#### **4.3 Improving Collaborative Chain Mechanisms and Gathering Joint Forces for Multi-Subject Talent Cultivation**

Establish a county-level overall planning, multi-party linkage, and clear-rights-and-responsibilities collaborative operation mechanism to resolve the problems of collaborative disconnection and "enthusiasm from schools but not enterprises" and gather joint forces for regional talent cultivation. First,

strengthen county-level top-level overall management. Set up a special industry-education integration leadership group led by the county government leader in charge, with participation from departments such as education, agriculture and rural affairs, human resources and social security, finance, and taxation. Formulate regional rural vocational education-industry integration development plans, coordinate policy, resource, and fund allocation, and build a county-level industry-education integration public service platform to achieve information exchange and resource sharing. Second, improve school-enterprise benefit-sharing collaborative mechanisms. Sign cooperation agreements with clear rights, responsibilities, and strong constraints, clarifying that colleges are responsible for teaching implementation, talent cultivation, and skills training, while enterprises are responsible for providing jobs, practical training scenarios, technical guidance, and employment channels. Establish benefit connection mechanisms such as talent delivery rebates and win-win technical cooperation, allowing enterprises to obtain actual benefits from participating in talent cultivation. Third, build bridges for school-local downward cooperation. Promote the full downward flow of vocational education resources to rural frontlines, simultaneously carry out services such as academic education, new-type professional farmer training, local talent skill improvement, and industrial technology guidance, and achieve two-way efforts and synergistic effects between academic education and social training.

#### **4.4 Perfecting Guarantee Chain Systems and Consolidating the Long-Term Foundation for Dual-Chain Matching**

Improve a three-in-one guarantee system of policies, funds, and evaluations to consolidate the institutional foundation for precise dual-chain matching and long-term operation. First, strengthen policy incentive implementation guarantees. Issue county-specific supportive policies, simplify approval processes, fully implement incentive measures such as tax reductions, financial subsidies, and honorary recognition for rural enterprises participating in industry-education integration, and effectively reduce enterprise participation costs. Improve special policies for the introduction, training, and professional title promotion of rural vocational education teachers, break identity

barriers to attract industrial talents to engage in rural vocational education, and establish a mechanism for retaining localized rural talents by issuing policies such as subsidies for returning home for entrepreneurship and employment and rewards for skill advancement. Second, increase diversified funding input guarantees. Build a diversified funding raising mechanism involving special fiscal investment, college self-raising, enterprise donations, and social capital participation, with a focus on tilting towards core links such as practical training base construction, core curriculum development, double-qualified teacher training, and school-enterprise cooperation projects. Third, construct a multi-dimensional evaluation system. Establish a four-dimensional evaluation mechanism of "college evaluation + enterprise evaluation + industry evaluation + social evaluation," take job adaptability, skill practical level, industrial service effectiveness, and employment and entrepreneurship rates as core evaluation indicators, force the improvement of industry-education integration quality and efficiency, and promote continuous precise matching and dynamic optimization of dual chains.

#### **5. Conclusion and Prospects**

The integration of industry and education in rural vocational education is a key measure to achieve precise matching between the "industry chain-talent chain," activate rural talent dynamics, and empower comprehensive rural revitalization. Current prominent dilemmas such as professional mismatch, talent cultivation disconnection, collaborative disconnection, and guarantee absence are essentially systematic problems caused by the lack of dual-chain collaborative mechanisms and poor supply-demand docking. Only by grounding in the actual development of county-level rural industries, optimizing talent cultivation layouts with industry chains as the traction, building bridges for dual-chain connection with industry-education integration as the starting point, and gathering joint forces for regional talent cultivation with multi-party collaboration as the guarantee, can the structural contradiction between talent supply and industrial demand be completely resolved, allowing rural vocational education to truly become a talent incubator for rural industrial revitalization, a platform for inheriting local techniques, and a kinetic support

for rural development.

In the future, with the intensification of trends such as digitalization, integration, and branding of rural industries, the integration of industry and education in rural vocational education needs to further focus on core directions such as digital skill cultivation, deep cultivation of local characteristic industries, cross-regional vocational education collaboration, and sharing of urban and rural vocational education resources. It should continuously optimize the dynamic dual-chain matching mechanism and promote the deep integration of talent cultivation and high-quality development of rural industries. At the same time, it is necessary to strengthen empirical research on the integration of industry and education in county-level rural vocational education, summarize typical practical cases and mature experiences from various regions, extract replicable, promotable, and implementable talent cultivation models, continuously enrich the theoretical system of industry-education integration in rural vocational education, and enable vocational education to better serve comprehensive rural revitalization and contribute to the modernization of agriculture and rural areas.

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