

# Research on the Innovation of the Carrier of the Vocational Education-Enterprise Cooperation System from the Perspective of Industry-Education Integration

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**Abstract:** The integration of industry and education is the core engine for the high-quality development of vocational education in the new era. The carrier of the school enterprise cooperation system is the key support for the implementation of industry education integration, and its innovation level directly determines the adaptability of vocational education to industry needs. This article is based on the current research status of vocational education school enterprise cooperation system carriers at home and abroad, combined with the practice of vocational education reform in China. It systematically analyzes the problems of theoretical lag, single mode, and insufficient collaboration in the current school enterprise cooperation system carriers, and constructs an innovative framework from the theoretical system, research perspective, and content dimension. It explores the construction path and operation mechanism of diversified system carriers, integrates digital transformation and diversified collaboration concepts, enriches the research depth and practical breadth, and provides solid theoretical support and feasible practical reference for promoting the deep integration of vocational education school enterprise cooperation and serving industry upgrading.

**Keywords:** Integration of Industry and Education; Vocational Education; School Enterprise Cooperation; Institutional Carrier; Innovation Path

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## 1. Introduction

The Implementation Plan for National Vocational Education Reform clearly proposes to deepen the integration of industry and education, school enterprise cooperation, and promote the resonance between vocational education and industrial development. With the deepening implementation of the Double High Plan and the rapid iteration of emerging industries, technological changes and industrial upgrading have put forward higher requirements for vocational education talent cultivation. Vocational education is facing the practical challenge of accurately matching the supply side of talent cultivation with the demand side of the industry<sup>[1]</sup>. The carrier of the school enterprise cooperation system, as the core link connecting the education chain, talent chain, industry chain, and innovation chain, undertakes multiple functions such as resource integration, collaborative education, and technology research and development, and is an important support for achieving deep integration of industry and education<sup>[2-3]</sup>. However, the traditional carrier model is constrained by concepts, mechanisms<sup>[4]</sup>, and resources, making it difficult to meet the high-quality development needs of vocational education in the new era<sup>[5]</sup>, and unable to

effectively solve the problem of talent cultivation being disconnected from industry demand<sup>[6-7]</sup>.

Currently, although China's vocational education school enterprise cooperation has achieved certain results under policy promotion and various cooperation carriers have gradually emerged, there are still many shortcomings in the institutional carriers<sup>[8]</sup>. Some cooperation carriers are merely formalities, lacking stable operating mechanisms and institutional constraints, and cooperation relationships rely heavily on short-term interests to maintain, making it difficult to form a long-term cooperation pattern; Carrier innovation focuses on traditional industries, but lacks adaptability to emerging formats and digital transformation trends<sup>[9-10]</sup>. Professional settings and curriculum system updates lag behind industrial technological changes, and cannot match the industry's demand for new technology and skilled talents; The coordination mechanism among multiple stakeholders is not perfect, the motivation for enterprise participation is insufficient, the bridging role of industry associations has not been fully utilized, and the government's guidance and regulation efforts and precision need to be improved, resulting in frequent problems such as imbalanced resource allocation, difficulty in balancing interests and demands, and vague division of responsibilities in the cooperation process. In this context, systematic research on the innovative path of vocational education school enterprise cooperation system carrier from the perspective of industry education integration, solving cooperation difficulties, and constructing a new system carrier that adapts to industrial development and education reform, has important theoretical value and practical significance for promoting high-quality development of vocational education, assisting industrial transformation and upgrading, and building a skilled society.

Domestic and foreign research has clearly identified the core position of the carrier of school enterprise cooperation system in the development of vocational education, forming a number of theoretical achievements and practical models with reference value. The carrier model of school enterprise cooperation in foreign vocational education has become mature after long-term development, forming distinctive development paths. However, influenced by institutional background, industrial structure, and cultural traditions, its core logic and implementation path are difficult to directly apply to the practice of vocational education in China. It needs to be localized and adapted according to China's national conditions. Domestic research mostly revolves around traditional carrier models. Although breakthroughs have been made in some areas, there are still common problems such as a disconnect between theory and practice, insufficient adaptability to emerging business models, and imperfect mechanisms for stakeholder collaboration. Existing research mostly focuses on a single type of carrier, lacking a systematic construction of the carrier system. The exploration of the integration of digital technology and carriers is not deep enough, making it difficult to support the promotion of school enterprise cooperation to a deeper level. At the critical stage of high-quality development of vocational education in our country, it is urgent to break through the limitations of traditional research and achieve carrier innovation from three dimensions: theory, perspective, and content. We need to construct a vocational education school enterprise cooperation system carrier system that is in line with China's national conditions, adapts to industry needs, and is both systematic and forward-looking.

This article takes the vocational education school enterprise cooperation system as the research core, and comprehensively sorts out the research status and practical experience at home and abroad through a combination of literature research, case analysis, and empirical research. It absorbs cutting-edge concepts such as digital governance and stakeholder collaboration, clarifies the core goals and content of carrier innovation, constructs a multidimensional innovation framework, and proposes targeted optimization strategies. The research aims to promote the transformation of vocational education school enterprise cooperation from shallow docking to deep integration, break down traditional cooperation barriers, improve collaborative education mechanisms, inject new momentum into the high-quality development of vocational education, and achieve resonance between vocational education and industrial development.

## **2.The core content and framework construction of innovation in the carrier of school enterprise cooperation system from the perspective of industry education integration**

### **2.1 Innovation dimensions and core content**

Breaking through the limitations of traditional research, integrating interdisciplinary theories such as education, management, and economics, absorbing cutting-edge achievements such as stakeholder theory, collaborative governance theory, and digital governance theory, and constructing a systematic theoretical framework for the carrier of school enterprise cooperation

system. Focusing on the problem of theoretical lag, deepening the analysis of the connotation of carriers, clarifying the constituent elements, operating mechanisms, and influencing factors of carriers, and clarifying the inherent relationship between carrier innovation, industry education integration, and industrial upgrading. Strengthen the research on the theory of multi subject collaboration, deeply analyze the interests and role positioning of enterprises, schools, students, industry associations, governments and other entities, break down the barriers to collaboration between entities, and build a multi subject collaboration mechanism with clear rights and responsibilities, shared interests, and efficient collaboration, providing solid theoretical support for carrier innovation.

From a single institutional perspective to a multi stakeholder perspective, comprehensively examine the construction and operation of the school enterprise cooperation system carrier, take into account the interests and demands of all parties, balance the educational and industrial attributes, and achieve the scientific and inclusive innovation of the carrier. At the same time, based on the development trend of emerging industries and new business forms, we focus on carrier innovation under the background of digitization and intelligence, deeply integrate digital technology with carrier construction, explore the construction path and operation mode of digital carriers, and enhance the adaptability of carriers to industrial changes. Breaking through regional and industry limitations, considering carrier layout and resource allocation from a global perspective, promoting the alignment of carrier construction with regional industrial layout and national industrial strategy, and enhancing the forward-looking and systematic innovation of carriers.

Focusing on the innovation of emerging industry carriers, keeping up with the trend of industrial digitization and intelligent transformation, exploring school enterprise cooperation carrier models in digital economy, new energy, high-end manufacturing and other fields, and promoting resonance between carrier construction and industrial development. Strengthen research on cultural integration and collaborative innovation, explore effective paths for the integration of school enterprise culture, organically integrate corporate culture with campus culture, consolidate cooperation consensus through cultural identity, cultivate collaborative innovation culture, promote deep upgrading of cooperation, and build a cooperative culture that combines educational attributes and industrial characteristics. Improve the evaluation and supervision mechanism for carriers, establish a multidimensional and scientific evaluation system, conduct comprehensive evaluations from aspects such as talent cultivation quality, resource utilization efficiency, cooperation and collaboration, and industrial service capabilities, establish a dynamic adjustment mechanism, and ensure the efficient operation and sustainable development of carriers.

## **2.2 Construction of Innovation Framework**

Based on the above innovative content, a three-dimensional integrated innovation framework for the carrier of school enterprise cooperation system is constructed, which includes theoretical support dimension, carrier type dimension, and operational guarantee dimension. Each dimension is interrelated and collaborates to form a complete innovation system, providing systematic support for carrier innovation practice.

The theoretical support dimension is based on interdisciplinary integration theory, integrating industry education integration theory, collaborative governance theory, human capital theory, absorbing stakeholder theory and digital governance concept, and constructing a theoretical foundation for carrier innovation. Through theoretical innovation, clarify the direction, principles, and paths of carrier innovation, clarify the interactive relationships and mechanisms between various subjects, provide solid theoretical guidance for carrier construction, and avoid blind and arbitrary carrier innovation. At the same time, strengthen the linkage between theory and practice, improve the theoretical system through practical feedback, and form a virtuous cycle of mutual promotion between theoretical innovation and practical exploration.

Construct a diversified carrier system based on the dimension of carrier types, including physical carriers and virtual carriers, single carriers and composite carriers, forming a carrier pattern of complementary advantages and collaborative linkage. The physical carrier focuses on industrial colleges, school enterprise cooperation bases, joint research and development centers, etc., strengthens the practical education function, builds a platform for connecting real production scenarios with teaching practice, and promotes the deep integration of theoretical teaching and practical training. Virtual carriers rely on digital technology to build virtual simulation training platforms, online course co construction platforms, etc., breaking through the limitations of time and space, expanding the breadth and depth of cooperation, and solving the problems faced

by traditional training such as resource shortages and limited scenarios. Integrating multiple resources through composite carriers, building an integrated platform for industry, academia, research and application, achieving collaborative promotion of talent cultivation, technology research and development, achievement transformation, and social services, and creating a comprehensive and multi-level cooperative ecosystem.

The operational guarantee dimension constructs a guarantee system from three levels: policy, mechanism, and resources, providing strong support for carrier innovation. At the policy level, improve relevant laws and regulations on the integration of industry and education, clarify the rights and obligations of all parties, increase policy support, strengthen policy implementation, optimize policy supply structure, form a normalized policy support mechanism, and create a good cooperation environment. At the mechanism level, establish a multi-party collaboration mechanism, interest distribution mechanism, evaluation and supervision mechanism, clarify the boundaries of rights and responsibilities of all parties, take into account the interests and demands of all parties, and ensure the standardized and efficient operation of the carrier. At the resource level, we will strengthen the guarantee of teachers, funds, equipment, technology and other resources, build a diversified resource supply system, promote resource sharing and optimized allocation, strengthen the construction of a "dual teacher" teaching staff, improve the quality of resource supply, and provide sufficient resource support for carrier innovation.

### **3.The practical path of innovation in the carrier of school enterprise cooperation system from the perspective of industry education integration**

#### **3.1 Optimize the construction of physical carriers and strengthen the practical education function**

Upgrade traditional physical carriers, upgrade existing school enterprise cooperation bases, industrial colleges, and other carriers, break free from the constraints of traditional cooperation models, clarify the rights, obligations, and responsibilities of both schools and enterprises in carrier construction, and build an equal, mutually beneficial, and long-term stable cooperative relationship. Optimize the carrier management and operation mode, establish a scientific decision-making mechanism and supervision system, promote the physical operation of carriers, improve daily management and assessment mechanisms, and avoid cooperation becoming a formality. Improve the governance structure of the Industrial College, establish a collaborative governance model between schools and enterprises, promote the joint participation of both parties in major decisions such as development planning, professional settings, curriculum development, faculty construction, and practical training management, achieve deep integration of education and industry development, and enhance the efficiency of sports personnel and industry service capabilities.

Create physical carriers for emerging industries, combine the development needs of emerging industries with technological trends, construct targeted physical carriers, and promote precise integration between carrier construction and industrial layout. In the field of digital economy, joint enterprises are building digital skills training bases, updating digital teaching equipment and software resources, introducing cutting-edge industry technologies and projects, and cultivating digital technology skilled talents. In the field of high-end manufacturing, we will jointly establish a precision manufacturing joint laboratory, focus on key industrial technologies and common problems for research, achieve synchronous promotion of technology research and development and talent cultivation, and promote the transformation and application of scientific research achievements. In the field of modern service industry, we aim to create a training center that integrates industry and education, optimize service scenarios and teaching resources, integrate intelligent service technology and concepts, and achieve deep integration between teaching and service processes. Through carrier innovation, promote precise matching between vocational education majors and emerging industry demands, and enhance the pertinence and adaptability of talent cultivation.

#### **3.2 Developing virtual carriers and expanding cooperation space**

Build a virtual simulation training platform, relying on advanced technologies such as virtual reality, artificial intelligence, and big data, to build a cross regional and cross industry virtual simulation training platform, simulate real production scenarios and workflows, and solve the problems of resource shortage, high risks, and limited scenarios faced in traditional training. The platform integrates technical resources from multiple enterprises and teaching resources from vocational colleges, achieving high-quality resource sharing, providing students with diverse practical training opportunities, helping them familiarize themselves with job operation norms and technical requirements, and enhancing practical skills

and emergency response capabilities. Relying on virtual platforms to carry out personalized practical training teaching, customized training content and processes based on students' cognitive characteristics, career planning, and skill foundations, promoting hierarchical teaching and personalized guidance, meeting the learning needs of different students, and improving the quality of practical training teaching.

Build an online collaborative innovation platform, establish virtual platforms such as school enterprise online course co construction platform and technology research and development exchange platform, break the limitations of time and space, and promote deep cooperation between schools and enterprises in curriculum development, teacher training, technology research and development, and achievement transformation. Through online platforms, enterprise technicians can deeply participate in course design, teaching guidance, and textbook development, integrating cutting-edge industry technologies, job requirements standards, and practical work cases into course content to enhance the practicality and pertinence of the course. College teachers can participate in enterprise technology research and development, project tackling, and technological transformation, understand industrial technology dynamics and job demand changes, enhance professional practical and scientific research innovation capabilities, and achieve two-way empowerment of school enterprise talents. Utilize the platform to collect industry dynamics, enterprise needs, and technical information, establish a dynamic adjustment mechanism, timely optimize teaching content, professional settings, and talent development plans, and enhance the adaptability of talent development to industry needs.

### **3.3 Building a composite carrier to achieve collaborative development**

To create an integrated carrier for industry university research and application, integrating resources from various sources such as universities, enterprises, and research institutions, and constructing a composite carrier that integrates talent cultivation, technology research and development, achievement transformation, and social services. The carrier focuses on key technologies and common problems in the industry, carries out joint research and development and achievement transformation, forms cross disciplinary and cross unit R&D teams, promotes the sharing of scientific research resources and complementary advantages, and accelerates the industrialization process of technological achievements. Timely integrate research and development achievements into the teaching process, update teaching content and methods, develop project-based courses and practical training materials, and promote deep integration between teaching research and industry needs. Relying on the carrier to carry out project-based teaching, allowing students to participate in real research and development projects and production practices, accumulate practical experience, enhance innovation ability and job adaptability, and achieve coordinated promotion of talent cultivation, technology research and development, and achievement transformation.

Building a regional carrier for the integration of industry and education, relying on regional industrial clusters, constructing a regional public service platform for the integration of industry and education, integrating resources such as vocational colleges, enterprises, industry associations, and governments within the region, and providing comprehensive services for school enterprise cooperation. Establish information docking channels on the platform, break down communication barriers between schools and enterprises, release industry talent demand information, university education resource information, and cooperation project information, and promote precise resource matching. Establish a dynamic monitoring mechanism for industrial talent demand, track regional industrial development trends and changes in talent demand, and guide vocational colleges to optimize their professional structure and talent training programs. Carry out skills training, technical exchanges, competition exhibitions and other activities, build a platform for school enterprise exchange and cooperation, and enhance the overall level of regional skilled talents and industrial competitiveness. Through the construction of regional carriers, the deep integration of vocational education and regional economy can be achieved, promoting the transformation and upgrading of regional industries and the high-quality development of vocational education.

### **3.4 Improve operational mechanisms to ensure sustainable development of carriers**

Establish a multi-party collaborative mechanism, clarify the role positioning of government, universities, enterprises, industry associations and other entities, and build a collaborative mechanism guided by the government, led by universities, participated by enterprises, and coordinated by industries. The government strengthens policy support and macroeconomic regulation, improves laws and regulations and incentive policies, optimizes resource allocation, creates a good cooperation

environment, and strengthens supervision and guidance of the cooperation process. Colleges and universities leverage their educational resource advantages, proactively connect with enterprise needs, optimize talent training models, strengthen faculty development, and enhance their ability to carry sports personnel and provide industry services. Enterprises should strengthen their main responsibility, actively participate in talent cultivation, technology research and development, and carrier construction, provide practical resources, technical support, and job docking services, and achieve win-win cooperation between industry and education. Industry associations play a bridging role, providing services such as industry standards, talent evaluation, and technical exchanges, promoting standardized cooperation and development, reflecting industry demands, and assisting the government in industry management.

Optimize the distribution of benefits and incentive mechanisms, establish a reasonable benefit distribution mechanism, take into account the interests and demands of both schools and enterprises as well as students, and achieve mutual benefit and win-win results. In terms of technology research and development achievement transformation, it is necessary to reasonably divide the profit distribution ratio, fully consider the investment and contribution of all parties in the research and development process, and stimulate the innovation enthusiasm of all parties. In terms of talent cultivation, enterprises prioritize hiring students trained through cooperative carriers to reduce recruitment and training costs; Colleges provide technical support, talent training, and scientific research services to enterprises, helping them upgrade their technology and build their talent teams, forming a symbiotic pattern of interests. At the same time, we will improve incentive policies, provide policy support and recognition publicity to enterprises that actively participate in school enterprise cooperation and achieve significant results, commend and reward outstanding teachers and students with development support, stimulate the enthusiasm of all parties to participate, consolidate cooperation achievements, and promote continuous deepening of cooperation.

Establish a scientific evaluation and supervision mechanism, establish a multidimensional and full process carrier evaluation system, with evaluation indicators covering aspects such as talent cultivation quality, technological research and development achievements, resource utilization efficiency, cooperation satisfaction, and industrial service capabilities. Adopt a combination of quantitative and qualitative evaluation methods to regularly evaluate the effectiveness of carrier operation. Introduce third-party evaluation agencies to ensure the objectivity and impartiality of evaluation results, and avoid bias caused by stakeholders' self-evaluation. Establish an application mechanism for evaluation results, linking evaluation results with resource allocation, policy support, and assessment rewards and punishments, and promoting carrier optimization and upgrading. At the same time, establish a supervision mechanism, strengthen the supervision and management of the construction and operation process of the carrier, clarify the supervision subject and responsibilities, improve the supervision process and feedback mechanism, timely discover and solve problems, standardize the behavior of all parties, and ensure the sustainable development of the carrier.

Strengthen the empowerment of digital governance, rely on technologies such as big data and artificial intelligence, build a digital governance platform for the integration of industry and education, integrate resources and data information from all parties, and achieve intelligent management of carrier operation. The platform monitors the real-time operation status of the carrier, collects and analyzes various data during the cooperation process, evaluates the effectiveness and existing problems of the cooperation, and provides data support for decision-making optimization. Realize intelligent matching between talent demand and training supply, and improve cooperation accuracy and efficiency. Build online communication and collaborative office channels, simplify cooperation processes, improve cooperation efficiency, promote the transformation of carrier operations towards digitization and intelligence, and enhance carrier governance capabilities and service levels.

## **5. Conclusion**

From the perspective of the integration of industry and education, the innovation of the carrier of vocational education school enterprise cooperation system is the core path to promote the high-quality development of vocational education, and it is also a key measure to solve the mismatch between talent training supply and demand and the transformation and upgrading of the service industry. This article draws the following conclusions through systematic research.

The current research on the carrier of school enterprise cooperation system at home and abroad has problems such as

theoretical and practical disconnection, single mode, and insufficient collaboration, which are difficult to meet the needs of high-quality development of vocational education and industrial transformation and upgrading in the new era. It is urgent to innovate from the theoretical, perspective, and content dimensions, build a carrier system that is in line with China's national conditions, and solve the traditional cooperation dilemma. The core goal of carrier innovation is to reveal the laws of development, improve the theoretical system, construct development models, and innovate training models. Its effectiveness is influenced by multiple factors such as carrier type, resource investment, and degree of cooperation. It is necessary to comprehensively consider the demands of all parties, balance educational and industrial attributes, achieve diversified collaborative development, and enhance the adaptability and operational efficiency of carriers.

Building a three-dimensional integrated innovation framework of theoretical support, carrier types, and operational support can effectively enhance the innovation level and operational efficiency of carriers by optimizing physical carriers, developing virtual carriers, constructing composite carriers, and improving operational mechanisms. This will promote the transformation of school enterprise cooperation from shallow docking to deep integration, and form a comprehensive, multi-level, and sustainable school enterprise cooperation ecosystem. Carrier innovation needs to strengthen digital empowerment and diversified collaboration, integrate industry development trends and era characteristics, and build a long-term cooperation mechanism with clear rights and responsibilities, shared interests, and shared risks. Practice has shown that diversified and composite carrier models can effectively integrate resources from all parties, achieve precise alignment between school enterprise collaborative education and industry demand, improve the quality of talent cultivation and industry service capabilities, and have good promotion value and application prospects.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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