Research on the Development of Vocational Undergraduate Education Organisations Driven by the Integration of Education and Industry

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Abstract: As a new type of higher education, the high-quality development of vocational undergraduate education hinges on the establishment of an education ecosystem that is highly compatible with the industry. This study, based on the CIPP theory, constructs an organizational development evaluation framework covering training positioning, resource investment, collaborative education, and service effectiveness. It examines typical models of industry-academia collaboration in domestic vocational undergraduate institutions, diagnoses the effectiveness and problems in strategic positioning, governance structure, and educational effectiveness, and analyzes the deep-seated contradictions at the organizational system, resource allocation, and governance mechanism levels. The research systematically designs organizational development paths from five dimensions: strategic positioning reformation, governance structure innovation, educational model transformation, faculty team reconfiguration, and evaluation mechanism optimization. The study holds that vocational undergraduate institutions need to transform from "industry followers" to "industry co-creators", establish a governance structure of multiple interest communities, build a "field engineer" training system, construct a two-way compatible teaching team of "practitioners and scholars and technicians", and establish a "quality assurance mechanism of evaluation and application closed loop", so as to drive the continuous development of the organization with the internal driving force of industry-academia collaboration.

Keywords: Vocational undergraduate education; Industry-academia collaboration; Organizational development; On-site engineers; Governance innovation

1. Introduction

As a new type and tier within higher education, the core of high-quality development in vocational undergraduate education lies in building an educational ecosystem that aligns closely with industrial development, job requirements, and technological transformation. This education cultivates “intermediate-level” vocational professionals who bridge R&D and production—specifically, “technical engineers” or “field engineers” capable of tackling complex production challenges, undertaking technical improvements and process design, and even engaging in innovative R&D [1,2]. They serve as the vital link connecting laboratory inventions with large-scale manufacturing applications. Failing to demonstrate its irreplaceable unique value risks marginalizing vocational

undergraduate education within the higher education landscape. Addressing these challenges demands profound shifts in institutional development orientation: educational models must transition from relatively closed "self-development" to more open "contribution-led" approaches; talent cultivation must shift from traditional "supply-oriented" methods to "demand-driven" models closely aligned with industry needs; and their societal role must evolve from "passive adaptation" to "proactive integration" into regional economic and social development [3]. Industry-education collaboration serves as the core driver of this transformation, with its underlying logic being the deep embedding of the education chain into regional modern industrial and innovation chains, positioning vocational undergraduate institutions as "strategic partners" in industrial upgrading.

Academic circles have already initiated multidimensional research on vocational undergraduate education. Text analysis of quality reports from 34 vocational undergraduate institutions reveals current characteristics of industry-education integration across four dimensions: educational positioning, resource allocation, collaborative talent development, and service effectiveness. Practical explorations by institutions such as Ningbo Vocational and Technical University, Suzhou Vocational and Technical University, and Shunde Vocational and Technical University respectively demonstrate the implementation pathways of a "service-oriented" development philosophy, a "co-evolution with industry" institutional ethos, and a "industry-driven education" reform approach [4]. However, existing research predominantly focuses on describing models or listing issues, with insufficient systematic theoretical construction treating industry-education collaboration as an endogenous driver of organizational development. Research systematically designing development pathways across multiple dimensions—including strategic positioning, governance structures, educational models, faculty teams, and evaluation mechanisms—remains urgently needed [5].

Therefore, this study, titled "Research on Organizational Development of Vocational Undergraduate Education Driven by Industry-Education Synergy", follows a logical sequence of "theoretical framework—practical examination—pathway innovation" to conduct systematic research. The paper begins by defining the typology of vocational undergraduate education, elucidating the theoretical logic of industry-education collaboration as an organizational development driver, and constructing core dimensions and an evaluation framework for organizational development. It further examines typical models of industry-education collaboration in domestic vocational undergraduate institutions, diagnoses their effectiveness and challenges, and analyzes the underlying contradictions constraining organizational development. Subsequently, it systematically designs organizational development pathways and mechanism innovations across five dimensions: strategic positioning reshaping, governance structure innovation, educational model transformation, faculty restructuring, and evaluation mechanism optimization. This aims to provide theoretical foundations and practical guidance for the high-quality development of vocational undergraduate education.

2. The Theoretical Framework and Logical Basis for The Development of Vocational Undergraduate Education

2.1 The Type Positioning and Organizational Characteristics of Vocational Undergraduate Education

Vocational undergraduate education, as a new type and level of higher education, the core of its high-quality development lies in constructing an educational ecosystem that is highly compatible with industrial development, job requirements, and technological changes. The emergence and development of vocational undergraduate education is a key measure to consolidate the status of

vocational education types and open up the growth channels for technical and skilled talents. Its internal logic requires achieving "two higher levels", namely, the mastery and systematicness of theoretical knowledge should be higher than those of vocational colleges, and the complexity and innovation of technical skills should be higher than those of ordinary undergraduate education. The core positioning of talent cultivation is to face complex production process problems, be able to undertake technical improvement, process design, and certain-scale innovative research and development, and become a key bridge connecting laboratory technological inventions and large-scale production applications in the workshop. From the perspective of organizational characteristics, vocational undergraduate colleges need to adhere to the characteristics of vocational education types and achieve a dual leap in educational and service levels based on this. Based on the CIPP theory's "background - input - process - effect" analysis framework, a theoretical review of the current development status and basic characteristics of the integration between industry and education in vocational undergraduate colleges can reveal that their organizational characteristics are mainly reflected in cross-border nature, integration, and adaptability - cross-border nature requires breaking the barriers between education and industry, integration requires achieving systematic coordination of resource elements, and adaptability requires maintaining dynamic responses to technological changes and industrial upgrading. These characteristics jointly constitute the organizational identification of vocational undergraduate education that distinguishes it from ordinary undergraduate and vocational college education [6].

2.2 Theoretical Explanation of Industry-Education Collaboration as a Driving Force for Organizational Development

From the perspectives of organizational change theory and ecosystem theory, the emergence of industry-education collaboration as the core driver of organizational development in vocational undergraduate education possesses profound theoretical logic. Without demonstrating its irreplaceable unique value, vocational undergraduate education risks marginalization within the higher education landscape. Addressing these challenges demands profound shifts in institutional development orientations: talent cultivation must evolve from traditional “supply-oriented” approaches to “demand-driven” models closely aligned with industry needs; and institutional roles must transition from “passive adaptation” to “proactive embedding” within regional economic and social development. For vocational undergraduate universities, serving industry is the quintessential expression of their institutional identity. The core lies in deeply embedding the educational chain within regional modern industrial and innovation chains, becoming “strategic partners” in industrial upgrading. Based on an integrated model of “platform reliance, project linkage, and team support,” a dynamic scenario of deep industry-education-research integration can be achieved: “platform reliance” ensures the hardware foundation and resource convergence for R&D and teaching; “project linkage” transforms real industrial technical challenges into specific research tasks and teaching cases; “team support” consolidates innovative forces including faculty, engineers, and students. This logic elucidates the transformation mechanism of industry-education collaboration evolving from external cooperation to endogenous drive. When enterprises deeply engage in the entire talent cultivation process and institutions fully integrate into the full industrial innovation chain, collaboration transcends mere “physical addition” to achieve “chemical fusion,” becoming an endogenous force propelling sustained organizational development. The integrated model pioneered by Ningbo Vocational and Technical University—comprising an industry research platform, a technical service

platform, an industry college, and multiple enterprise colleges—serves as a practical validation of this theoretical framework.

2.3 Core Dimensions and Evaluation Framework for Organizational Development

Drawing on existing research, this study constructs core dimensions and an evaluation framework for the organizational development of vocational undergraduate education. Based on textual analysis of annual quality reports from 34 vocational undergraduate institutions, the current state and characteristics of industry-education integration in these institutions manifest across four dimensions: educational positioning, resource allocation, collaborative education, and service effectiveness. The training orientation dimension examines whether institutions clearly anchor their goals to cultivating "technical engineers" or "field engineers" and whether they have established a specialized curriculum system precisely aligned with industry demands. Resource Investment assesses the completeness of dual-qualified faculty development, practical training facilities, and jointly established industry-academia platforms; Collaborative Education evaluates the depth of corporate involvement in curriculum design, course development, internships, and assessment; Service Outcomes measures the institution's tangible contributions to industrial development through technological R&D, achievement commercialization, and workforce training. Ningbo Vocational and Technical University concretizes its "service orientation" into "four services": Serving industry demands by focusing on deep integration, acting as a source of technical and skill innovation; Serving students by focusing on lifelong development, cultivating the future workforce for industries; Serving the region by focusing on openness and sharing, building a city-university symbiotic community; Serving innovation by focusing on momentum transformation, establishing a new engine for pilot testing, maturation, and achievement transformation. Suzhou Vocational and Technical University adheres to the educational philosophy of "coexisting with industry, advancing with enterprises, and developing with the city." Guided by innovation and supported by practice, it continuously optimizes its talent cultivation model. Synthesizing the above research, this chapter constructs an organizational development evaluation framework encompassing dimensions such as strategic positioning, resource allocation, governance structure, educational outcomes, and service contributions. This framework provides a systematic analytical tool and theoretical reference for subsequent chapters to analyze current practices, diagnose key issues, and design optimization pathways.

3. Practical Examination of Organizational Development in Vocational Undergraduate Institutions Driven by Industry-Education Collaboration

3.1 Examination of Typical Models of Industry-Education Collaboration in Domestic Vocational Undergraduate Institutions

A systematic review of typical practice models in industry-education collaboration among domestic vocational undergraduate institutions reveals several valuable pathways for reference. Textual analysis of annual quality reports from 34 vocational undergraduate institutions, grounded in the CIPP theoretical framework ("Context-Input-Process-Outcome"), reveals that the current state and characteristics of industry-education integration manifest across four dimensions: educational positioning, resource allocation, collaborative talent development, and service effectiveness. At the practical level, institutions have developed distinctive models centered on these dimensions.

Suzhou Vocational and Technical University's exploration holds exemplary significance. Guided

by the educational philosophy of "coexisting with industry, advancing with enterprises, and developing alongside cities", the university spearheaded the establishment of a national-level robotics and intelligent manufacturing city-wide industry-education consortium. This initiative integrates resources from 114 leading enterprises specializing in manufacturing key robot components, robot bodies, and system integration. Collaborating with 14 institutions and 5 research institutes, it has built a substantive platform integrating scientific research, talent cultivation, technology incubation, and achievement transfer. Within this consortium framework, the university implements distinctive training programs including "corporate-sponsored classes", "field engineer classes", and "innovation classes". It conducts joint recruitment and teaching with enterprises, using real-world projects to drive practical skill enhancement. Collaborations with industry leaders like Inovance Technology have transcended mere recruitment, evolving into a comprehensive synergy model featuring co-developed talent standards, jointly researched curricula, and shared training bases. Through the "corporate academy + industry professors" mechanism, enterprise engineers regularly engage in classroom instruction.

Ningbo Vocational and Technical University's approach also merits attention. The institution pioneers a service-oriented development path characterized by deep industry-education integration and significant societal contribution, constructing a specialized cluster complex comprising "industrial research platforms + technical service platforms + industry colleges + multiple corporate academies". Its core strategy involves each professional cluster establishing deep connections with at least one undergraduate institution possessing high-level teams and advanced platforms, one industry association that understands industry standards and resources, one regionally rooted industrial park aligned with the discipline, and multiple leading enterprises driving cutting-edge technological development. This creates a three-dimensional framework characterized by "linking upward, connecting horizontally, and rooting downward". Shunde Polytechnic University has established a development approach centered on "industry-driven curriculum design, industry-guided teaching, industry-inspired curriculum reform, and industry-facilitated education". It is building a three-dimensional science and innovation system that integrates "platforms-teams-projects" and establishing a chain-based transformation mechanism that connects "research outcomes-products-commercial goods". These exemplary models collectively demonstrate the organizational evolution trajectory of industry-education collaboration, transitioning from a "physical addition" to a "chemical fusion".

3.2 Diagnosing the Outcomes and Challenges of Industry-Education Collaboration in Driving Organizational Development

A systematic review of practices at vocational undergraduate institutions reveals that industry-education collaboration has achieved significant results in driving organizational development, yet notable challenges persist. Qualitative analysis from the student perspective indicates that the industry-education integration model significantly empowers students in accumulating professional knowledge, enhancing specialized skills, exploring learning strategies, improving communication abilities, and elevating professional competence. Suzhou Vocational University has implemented mechanisms such as "PhDs in Industry" and "Two-Way Rotation Programs" to encourage faculty to transform cutting-edge industrial technologies into teaching cases, ensuring students master core industry competencies. Its vocational undergraduate programs center on cultivating "job-specific applicability," establishing a four-tier practical training system:

"foundational training—composite projects—integrated application—graduation design." Students experience substantial skill enhancement while solving real-world problems. Over the past three years, students have collectively filed 97 patent applications and secured 66 software copyright registrations, with multiple achievements successfully serving regional industrial development.

Nevertheless, critical challenges persist in integrating industry and education within vocational undergraduate programs. Analysis of quality reports from 34 vocational undergraduate institutions reveals key issues: incomplete conceptual understanding and unclear educational positioning; significant disparities in institutional resources and inadequate "dual-qualified" faculty; superficial collaborative education and lack of distinctive institutional characteristics; insufficient service awareness and room for improvement in service capabilities. Diagnoses from the student perspective further reveal issues in practical settings, including deviations in educational philosophy, mismatches between objectives and effectiveness, resource constraints, lax management mechanisms, and weak support systems. From a symbiosis theory perspective, the first cohort of 15 vocational undergraduate institutions faces widespread challenges in industry-education integration consortia: loose connections among symbiotic units, suboptimal symbiosis models, and insufficient environmental support. The greatest risk in school-enterprise collaboration is one-sided enthusiasm. The previous superficial model—where enterprises provided internships and schools supplied students—fails to meet the high standards of vocational undergraduate education or address industry's demand for high-end talent amid industrial upgrading.

3.3 Analysis of Deep-Seated Contradictions and Key Challenges Constraining Organizational Development

An in-depth analysis across three dimensions—organizational systems, resource allocation, and governance mechanisms—reveals the deep-seated contradictions and key challenges hindering the organizational development of vocational undergraduate education. Examined through the lens of organizational inertia, current vocational undergraduate institutions universally face inertia in cognition, resources, structure, and systems. This not only impedes transformative development but also generates a series of negative effects. Vocational undergraduate institutions have emerged either through the elevation of higher vocational colleges or the restructuring of independent colleges in collaboration with higher vocational colleges. This transformation model combines top-down policy initiatives led by the government with practical institutional exploration. Such a transition requires both external form and internal substance to align, breaking free from past development patterns and path dependencies to achieve systemic change in educational philosophy, positioning, models, and organizational structures.

At the institutional level, vocational undergraduate education, as a nascent phenomenon, is still in the process of constructing its organizational identity and institutional environment. From the perspective of organizational sociology's new institutionalism institutionalization theory, vocational undergraduate education, as an emerging organizational field, faces the challenge of insufficient institutionalization. It remains an immature organizational field characterized by weak governance, lacking both a sufficiently diachronic institutionalization process in the process dimension and a solid foundation of core institutional elements in the structural dimension. At the level of social perception, the notion that "vocational education is inferior" remains deeply ingrained. Although policies explicitly state that vocational undergraduate degrees hold equal validity to regular undergraduate degrees, societal recognition still requires time to cultivate. At the level of resource allocation,

disparities in educational conditions are significant. The inadequacy of the "dual-qualified" faculty is a widespread issue, with teachers' research literacy and practical capabilities needing improvement. High-level teams are scarce and operate with low efficiency. At the governance level, collaborative education remains superficial, institutional distinctiveness is underdeveloped, and long-term cooperation mechanisms between schools and enterprises are lacking. The organizational inertia observed in vocational undergraduate institutions stems from a combination of adaptive choices under external pressures, path dependencies formed during organizational development, and their subsequent lock-in effects. Resolving these deep-seated contradictions requires concerted efforts from multiple stakeholders—including governments, schools, and industry enterprises—to advance conceptual innovation, resource empowerment, organizational transformation, and institutional reform in an integrated manner.

4. Organizational Development Pathways and Mechanism Innovation in Vocational Undergraduate Education Driven by Industry-Education Synergy

4.1 From "Industry Follower" to "Industry Co-Creator"

Guided by a "service-oriented" development philosophy, vocational undergraduate institutions must fundamentally reshape their strategic positioning. For these universities, "service orientation" transcends functional description—it embodies the intrinsic requirement of vocational undergraduate education's nature and the inevitable choice for value creation, reflecting a comprehensive, proactive, and embedded development philosophy. Changchun Vocational and Technical University explicitly advocates upgrading from an "industry follower" to an "industry co-creator"—a transformative positioning with broad applicability. Key pathways include: Precisely anchoring to industry demands by establishing a systematic industry needs research mechanism. Through "industry-specific analysis, industrial park-based mapping, and enterprise-level selection", dynamically generate regional key industry development roadmaps, technical requirement inventories, and talent demand lists; Building high-level professional clusters by identifying 1-2 core majors with strong industry alignment and distinctive strengths around key industrial chain segments. Integrating supporting majors based on upstream/downstream technical linkages and job requirements to form clusters covering critical industrial technology domains; Establishing a dynamic program adjustment mechanism grounded in "demand orientation, condition compliance, and distinctive positioning" to implement plans for program "discontinuation, suspension, consolidation, optimization, and establishment". Ultimately, through the construction of a precise program-industry matching mechanism, professional clusters will both integrate into the regional industrial ecosystem and serve as engines to invigorate regional economic vitality, achieving mutual empowerment between program development and regional industrial growth. Suzhou Vocational and Technical University's leadership in establishing the National Robot and Intelligent Manufacturing Municipal Industry-Education Consortium—integrating resources from 114 leading industrial enterprises—is a prime example of this transformation from "industry follower" to "industry co-creator".

4.2 Establishing Collaborative Mechanisms for a Multi-Stakeholder Community

Breaking through traditional university-enterprise collaboration models and establishing a governance structure involving multiple stakeholders is an essential requirement for advancing industry-education synergy into deeper waters. Reform in these deeper waters begins with restructuring authority and responsibilities. For instance, the School of Transportation at Shandong

Engineering Vocational and Technical University partnered with Chery Automobile to establish an industry-academic college, forming a dual governance board where enterprise representatives hold substantive voting rights in program design, curriculum updates, and even student evaluations. This transforms enterprises from "participants" into "organizers." The specific implementation can unfold across three levels: First, establish an education platform tailored for industry-academia-research synergy. By contributing capital, equipment, patents, and other intellectual property as equity, collaborate with leading enterprises and research institutions to jointly fund the establishment of an independent legal entity. Second, systematically restructure internal resources by integrating corporate production equipment, scientific instruments, and teaching/training facilities under unified management. Establish a shared equipment pool to create a multifunctional platform combining "teaching workshops + research laboratories + pilot production bases". Third, establish a full-chain operational mechanism. Starting from local industrial needs, the platform entity undertakes corporate R&D projects, organizing joint research teams of scientists and faculty. Simultaneously, the R&D process is transformed into teaching content, ultimately achieving industrialization of technological achievements through the entity company. This forms a closed-loop ecosystem: "industrial challenges → scientific breakthroughs → pedagogical transformation → market application". Suzhou Vocational and Technical University's collaboration with industry leaders like Huichuan Technology has transcended mere recruitment. It has evolved into a comprehensive synergy model featuring co-development of talent standards, joint research on curriculum systems, and shared training bases. Through the "corporate academy + industry professors" mechanism, enterprise engineers regularly engage in classroom instruction, achieving substantive innovation in governance structures.

4.3 Transformation of Educational Models: A Training System Centered on "Field Engineers"

Systematically restructuring the talent cultivation system around the goal of training "field engineers" is the core initiative for vocational undergraduate education to demonstrate its distinctive characteristics. Vocational undergraduate education cultivates "intermediate-level" professionals bridging R&D and production—high-level technical specialists whose knowledge structure centers on fieldwork logic, whose competency development focuses on solving complex workplace problems, and whose competency cultivation targets innovation needs in technical practice settings. Suzhou Vocational and Technical University has established a four-tier practical system—"foundational training—composite projects—integrated application—graduation design"—centered on cultivating job-specific competencies, providing a practical model for educational transformation. Specific pathways include: - Curriculum Innovation: Establishing a "343" holistic course development model. Guided by three design principles—technical practice, work processes, and task-driven learning—it constructs a four-dimensional curriculum structure of modules, projects, tasks, and case studies. This integrates three types of course resources: enterprise projects, service projects, and competition projects. In teaching methodology innovation, leveraging the industry-academia-research-training-innovation teaching system to drive a "classroom revolution." Through progressive learning pathways designed as "skills training → innovation practice → research transformation," achieving deep integration of industry, science, and education elements throughout the learning process; In practice system construction, it follows a "stepwise progression" principle, adopting a five-stage model—"cognition → fundamentals → specialization → integration → innovation"—to significantly enhance students' comprehensive practical abilities within authentic, complex engineering scenarios. Shunde Polytechnic systematically transformed a real-world

enterprise project — "3D Visual Tracking Space Station"—into four major scenario-based training modules: sensor imaging, algorithm design, human-machine interface development, and system integration testing. This approach equipped students with advanced skills in AI algorithm development and robotics software applications, achieving seamless alignment between talent cultivation and industry demands.

4.4 Building Teaching Teams with Dual-Track Compatibility for Educators and Technicians

Focusing on enhancing faculty members' "industry dialogue capabilities", the development of a "dual-qualified" teaching force—equipped with both educational expertise and industry service skills—serves as the talent foundation for the organizational growth of vocational undergraduate programs. Suzhou Vocational and Technical University implements a "faculty + engineer" blended teaching model, transforming classrooms into "micro-scale technical challenge sites." Through solving real-world problems, students experience significantly heightened learning motivation and problem-solving abilities. Specific approaches include: Faculty Formation: Breaking down barriers between education and industry to build cross-disciplinary teaching teams integrating industry, academia, and education. Establishing heterogeneous, cross-departmental, cross-disciplinary, and cross-institutional innovation teams for scientific and technological advancement and teaching innovation. Focusing on cultivating subject leaders and discipline heads centered around corporate vice presidents of technology, industry professors, and university professors engaged in social service. For capacity enhancement mechanisms, implementing a "dual-appointment, two-way mobility" system for faculty and corporate mentors, organizing regular faculty immersion in corporate R&D and production practices, and inviting corporate technical experts to serve as adjunct instructors on campus. For practical development, adopting modular teaching as the core approach to facilitate cross-disciplinary collaboration, guiding university faculty and corporate mentors to co-design curricula that transform industrial projects and technical challenges into modular teaching content. Through its "PhDs in Industry" and "Two-Way Exchange Rotation" mechanisms, Suzhou Vocational and Technical University drives faculty to transform cutting-edge industrial technologies into teaching cases, ensuring students master core industry skills. Over the past three years, students have collectively applied for 97 patents and obtained 66 software copyrights, with multiple achievements successfully serving regional industrial development. This exemplifies the concentrated educational outcomes of the "Academic-Practitioner" dual-adaptive teaching team model.

4.5 Establishing a Quality Assurance System with Closed-Loop Evaluation and Application Alignment

Building an evaluation system that spans the entire talent development cycle and achieves closed-loop feedback from the "training process" to "career development" provides the institutional foundation for ensuring the continuous deepening of industry-education collaboration. Regarding evaluation entities, establish a multi-stakeholder collaborative assessment mechanism that deeply integrates enterprises into the entire talent evaluation process. Companies should participate in setting course assessment standards and evaluating practical training and internships, with their assessments of students' job competency serving as key criteria for graduation eligibility. Shandong Engineering Vocational and Technical University's practice in its order-based training program with Li Auto—where enterprises conduct monthly job competency assessments directly impacting internship placements—is worthy of broader adoption. Regarding evaluation content, the focus is on

"cultivating both moral character and technical skills, with competency as the foundation", centered on four core dimensions: digital literacy, professional theoretical knowledge, occupational action capability, and technological innovation capacity. The evaluation mechanism establishes a dynamic closed-loop system spanning "training-employment-development", extending the assessment timeframe from pre-employment to post-employment. By tracking graduates' career development data over 3-5 years, it creates a feedback loop for talent cultivation quality. By implementing school-based assessments of humanistic literacy, core professional competencies, and innovative practical abilities, and integrating corporate feedback to continuously refine training programs, we ensure talent output remains aligned with industry demands, achieving a virtuous cycle of "evaluation-improvement-enhancement". Qualitative analysis from the student perspective indicates that the industry-education integration model significantly empowers students in accumulating professional knowledge, enhancing specialized skills, exploring learning strategies, improving communication abilities, and elevating professional competence. Incorporating this impact into the evaluation system enables a more comprehensive measurement of the educational outcomes achieved through industry-education collaboration.

5.Conclusion

This study systematically constructs an organizational development framework for vocational undergraduate education driven by industry-education collaboration. The research reveals that the transformation mechanism of industry-education collaboration—shifting from external cooperation to endogenous drive—lies in the following: when enterprises deeply engage in the entire talent cultivation process and institutions deeply integrate into the entire industrial innovation chain, industry-education collaboration elevates from a "physical addition" to a "chemical fusion." The core of organizational development lies in achieving the following transformations: shifting strategic positioning from "industry follower" to "industry co-creator"; upgrading governance structures from "school-enterprise partnerships" to "multistakeholder communities"; refocusing talent cultivation models from "supply-oriented" to "field engineer-oriented"; integrating faculty teams from "single teaching roles" to "scholar-technician hybrids"; and optimizing evaluation mechanisms from "process assessment" to "closed-loop performance-based evaluation." Future research may further explore new forms of industry-education collaboration in the AI era and deeper pathways for vocational undergraduate education to serve the development of new quality productive forces.

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