

ARTICLE

Evolutionary logic evaluation system and optimization path based on the governance model of modern industrial colleges

Ye Mei^{1,2,*}¹Qingdao Harbor Vocational & Technical College, Port and Shipping Logistics, Qingdao, Shandong province, 266404, China²College of Arts and Sciences Education, Trinity University of Asia, Manila 1102, Philippines**ABSTRACT**

As an institutional innovation platform for deepening industry-education integration, the scientific governance model of modern industrial colleges directly determines the alignment efficiency between talent cultivation and industrial demands. This study systematically traces the evolutionary trajectory of China's modern industrial college governance models through the trident spiral synergy theory and stakeholder theory, categorizing them into three phases: resource-sharing, co-development, and industry-led. Through case analysis of nine representative institutions, the study identifies three governance paradigms—teaching-point oriented, enterprise-oriented, and hybrid—each characterized by distinct features. An evaluation system is established with four secondary indicators (governance responsibility, governance structure, governance mechanism, and governance effectiveness) and twelve tertiary indicators. Using enhanced fuzzy comprehensive evaluation and entropy value methods for indicator weighting, the results reveal governance responsibility (34.91%), governance effectiveness (25.757%), and governance mechanism (25.681%) as core dimensions. Finally, four optimization pathways are proposed across resource integration, decision-making enhancement, efficiency improvement, and accountability reinforcement to provide theoretical support and practical guidance for high-quality development of modern industrial colleges.

Keywords: modern industrial college, governance model, evaluation system, industry-education integration, collaborative education

INTRODUCTION

Establishing industrial colleges to explore high-quality development models for higher vocational education and enhance the quality and industrial adaptability of Homo sapiens talent cultivation has emerged as a pivotal and forward-looking initiative in China's educational landscape. This innovative approach not only serves as a crucial pathway for the modernization of vocational education in the country but also aligns with the urgent need to bridge the gap between academic training and industrial demands in an era of rapid economic

transformation^[1]. Industrial colleges, with their long-standing history and diverse operational models abroad, offer a rich repository of experiences that can provide important references for the development of contemporary vocational education in China, offering insights into how to effectively integrate educational resources with industrial practices^[2]. Currently, against the backdrop of the in-depth development of new quality productive forces, which are driven by technological innovation and industrial upgrading, hybrid ownership industrial colleges have emerged as a significant and promising form from a theoretical perspective, blending the

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strengths of different ownership structures to foster more flexible and industry-responsive educational frameworks^[3]. Moreover, the advent of comprehensive Homo sapiens artificial intelligence has opened up unprecedented new horizons for the development of modern industrial colleges, revolutionizing teaching methods, skill training, and industry-academia collaboration. In this context, the empowering role of these technological advancements, the reform strategies adopted by higher vocational institutions, and the practical explorations undertaken by industrial colleges within the modern industrial system all offer valuable insights that can inform future development directions^[4,5].

In the context of the deep integration between industrial transformation and upgrading on one hand and educational reform on the other, modern industrial colleges have increasingly become a crucial and irreplaceable bridge connecting higher education with industrial development, facilitating the seamless flow of knowledge, skills, and talent between the two domains. Since 2017, the Chinese government has intensively introduced a series of supportive policies, such as the “Several Opinions on Deepening Industry-Education Integration” and the “National Pilot Implementation Plan for Industry-Education Integration Construction,” which have collectively propelled China’s modern industrial colleges from the stage of theoretical exploration into concrete and large-scale practical implementation. By 2023, this momentum had led to over 100 universities nationwide participating in two batches of construction efforts, each contributing to the formation of a diverse array of governance models that cater to the specific needs of different regions and industries. However, despite these significant strides, the inherent complexity of cross-organizational collaboration—involving universities, enterprises, government agencies, and other stakeholders—has given rise to a range of issues in some industrial colleges. These include a tendency towards “prioritizing form over effectiveness,” where the focus is on establishing the outward structure rather than ensuring substantive outcomes, and “emphasizing resource input over mechanism innovation,” where the accumulation of resources takes precedence over the development of sustainable operational mechanisms. At the heart of these challenges lies the imperfections of their governance systems, which struggle to balance the diverse interests and objectives of all involved parties^[6,7].

Existing research in the field of industrial college governance predominantly focuses on empirical summaries of various governance models—such as case studies of specific institutional collaborations or descriptive analyses of operational frameworks—or preliminary design of evaluation indicators that often remain at a conceptual or theoretical level^[8,9]. These discussions, while valu-

able, are largely centered around the surface-level mechanisms of modern governance within industry-academia institutes, tending to emphasize observable practices over underlying structural dynamics. However, there remains a notable lack of systematic deconstruction of the governance model evolution logic—specifically, the historical, institutional, and contextual factors that drive shifts in governance structures over time—and a scarcity of rigorous quantitative validation of evaluation systems, which limits their practical applicability and generalizability across diverse industrial and educational contexts.

Building upon this foundation of existing literature and its identified gaps, the research value of this paper manifests in three distinct yet interconnected aspects: First, it aims to analyze the evolutionary patterns of governance models through a historical institutionalism perspective, which involves examining how path dependencies, critical junctures, and institutional layering have shaped the development of industrial college governance. This approach not only seeks to uncover the deep-seated logic behind model transformations but also to fill the theoretical research gaps by providing a more nuanced and historically grounded understanding of governance evolution. Second, it endeavors to construct an evaluation system that combines scientific rigor with practical applicability, integrating both qualitative dimensions—such as stakeholder satisfaction and collaborative efficiency—and quantitative metrics—including resource allocation effectiveness and talent cultivation outcomes. This dual-focus system will provide quantifiable tools for policymakers and practitioners, enabling more precise assessment and iterative improvement of governance practices. Third, it proposes targeted optimization strategies that address the root causes of governance inefficiencies, such as misaligned incentives or fragmented decision-making processes, with the ultimate goal of propelling industry-education integration from a state of “physical combination”—wherein institutions and enterprises merely coexist without deep synergies—to a “chemical reaction”—characterized by seamless knowledge transfer, shared value creation, and dynamic adaptation to industrial and technological changes.

EVOLUTION AND TYPOLOGICAL ANALYSIS OF GOVERNANCE MODELS OF MODERN INDUSTRIAL COLLEGES

Evolution logic: From resource exchange to value co-creation

The evolution of the governance mode of modern industrial colleges in China has gone through three stages, and its dynamic mechanism and core characteristics show significant differences.

The Resource Sharing Model (2000–2010) marked the initial stage of industry-academia collaboration in China’s vocational education landscape, a period characterized by fledgling partnerships that were primarily rooted in the practical exchange of tangible and human resources between universities and enterprises. During this early phase, the core of these industry-academia partnerships centered on straightforward resource exchange: companies, eager to address their immediate operational needs, provided vocational colleges with training bases equipped with basic industrial equipment and machinery, often tailored to their specific production processes, while universities, in turn, supplied businesses with interns—typically students in their final year of study—who were seeking hands-on experience to complement their classroom learning. This reciprocal arrangement, though functional, was underpinned by a governance structure that was relatively simplistic, characterized by a single authority figure or entity (usually the university) and an ambiguous division of responsibilities between the collaborating parties, with little clarity on long-term roles, obligations, or decision-making processes.

A prime and widely observed example of this model was the collaboration between local vocational colleges and regional manufacturing firms, which were then experiencing rapid growth amid China’s industrial expansion. In these partnerships, the governance objectives were narrowly focused on addressing two pressing and interrelated challenges: on one hand, the acute labor shortages faced by enterprises, particularly for entry-level positions that required basic technical skills, and on the other, the insufficient practical teaching resources in higher education institutions, where limited access to real-world industrial settings often left students ill-prepared for the demands of the workforce. This stage’s governance framework, as a result, exhibited a distinct “university-led, enterprise passively involved” pattern: universities took the lead in initiating and managing the collaborations, designing internship programs, and coordinating student placements, while enterprises, though willing to participate to meet their short-term labor needs, often played a reactive role, providing resources without actively engaging in curriculum design, skill assessment, or long-term strategic planning. Consequently, these partnerships lacked sustainable long-term collaborative mechanisms, with little emphasis on building mutual trust, aligning interests, or creating shared value—factors that would later become critical for more mature industry-academia integration^[10,11].

The Co-development Model (2010–2020): With the advancement of industry-academia-research integration policies, governance entities expanded to include government bodies and industry associations, forming a tripartite collaborative framework among universities, en-

terprises, and governments. The governance objective shifted from “resource complementarity” to “joint talent cultivation,” enhancing the quality of talent development through joint curriculum design and collaborative course system construction. For instance, Dongguan University of Technology’s Intelligent Manufacturing Innovation Center implemented a “Council + Professional Advisory Committee” mechanism, achieving organic integration of government policy guidance, university teaching implementation, and enterprise technology input, as shown in Table 1.

Table 1: Analysis of high-frequency words in modern industrial college policies

High-frequency vocabulary	Frequency of occurrence	Core policy orientation
System	4	Improve the collaborative governance process
Industry	3	Meet the needs of industrial development
College	3	Strengthen the nature of education
Funds	2	Ensure resource input
Directorate	1	Engage businesses in decision-making

Industry-led (2020–present): Under the educational reform initiatives of New Engineering and New Medicine, industry colleges have become deeply involved in industrial chain innovation, with governance objectives upgraded to “joint technology research + standard co-construction + talent co-cultivation”^[12]. In the new era, aligning academic disciplines with the strategic positioning of emerging industry colleges serves as a crucial pathway for advancing modern educational governance^[13]. Enterprises are transitioning from “participants” to “leaders,” deeply integrating into governance processes through equity participation and technology equity investments. For instance, Hangzhou Normal University’s Alibaba Modern Industry College leverages its board governance mechanism to directly translate e-commerce industry standards into teaching content, achieving seamless alignment between talent cultivation and industrial demands.

Typological division of governance modes

Based on the differences in the allocation of rights and responsibilities and the operational mechanisms of governance subjects, the governance mode of modern industrial college can be divided into three categories:

The first model is the teaching-point governance structure. This framework relies on university secondary colleges as the fundamental operational units, with enterprises playing a supplementary role that is primarily con-

financed to undertake practical training functions. Within this setup, the governance focus lies firmly on the smooth implementation of pre-drafted teaching plans, ensuring that theoretical courses are complemented by hands-on learning experiences. It is characterized by a “university academic affairs office coordination + enterprise training base collaboration” structure, where the academic affairs office takes charge of organizing curriculum schedules, assigning faculty, and monitoring teaching quality, while enterprises provide the physical space, equipment, and occasional on-site instructors for training sessions. Decision-making processes within this model heavily depend on the university’s internal administrative system, with little room for enterprise input in key areas such as curriculum design or talent cultivation objectives. While this structure is well-suited for traditional majors with stable and predictable industry demands—where skill requirements change at a slower pace—it suffers from notable limitations. These include low enterprise engagement, as businesses often view their role as a passive obligation rather than an active partnership, and a tendency for talent cultivation to lag behind industrial development, as academic plans struggle to keep up with the rapid technological and process changes in the corporate world.

The second aspect involves corporate governance. This model operates by implementing modern enterprise systems with a board of directors as the core decision-making body, where enterprises exercise governance over the collaborative process through either capital investment that secures significant ownership stakes or direct control over critical resources such as advanced technology, production lines, or market channels. The governance structure adopts a rigorous three-tier framework: “board decisions-executive implementation-supervisory committee oversight,” ensuring a clear separation of powers and accountability. Within this system, profit distribution and risk allocation strictly follow market-oriented principles, with each stakeholder’s returns and liabilities directly tied to their investment or contribution. Taking Shanghai Construction Management Vocational College as a concrete example, its shareholding system meticulously clarifies equity ratios among participating universities, leading construction enterprises, and relevant industry associations. This arrangement creates a direct link between the quality of talent cultivation—measured by graduate employability, skill matching, and industry reputation—and corporate profits, incentivizing enterprises to actively participate in curriculum development, faculty training, and practical assessment to ensure that educational outcomes align with their operational needs.

The third approach is hybrid governance. This model establishes a comprehensive multi-stakeholder governance platform that actively involves “government, universities, enterprises, and industries,” recognizing the unique roles each can play in advancing industry-education integration. It utilizes formal consultative mechanisms such as boards of directors, joint conferences, and expert committees to balance responsibilities, negotiate interests, and resolve conflicts among the diverse participants. The governance structure follows a “decentralized decision-making with centralized execution” framework: while strategic decisions and policy directions are made collectively through stakeholder consultations to reflect multiple perspectives, day-to-day operations and project implementation are managed by a dedicated executive team to ensure efficiency and coherence. A prime example is the “Intelligent Rail Transit” Modern Industry College at Hunan Railway Science and Technology Vocational College, which employs a contractual governance model featuring “four-in-one integration”—integrating talent cultivation, technological innovation, production services, and standard-setting. This model clearly articulates rules regarding equity distribution based on resource contributions, talent rotation mechanisms that allow faculty and enterprise experts to exchange roles, and profit-sharing arrangements that reward all stakeholders for their involvement. By formalizing these elements in legally binding agreements, the hybrid governance model achieves a dynamic equilibrium among stakeholders, fostering sustained collaboration and adaptability to evolving industrial and educational landscapes.

Practical characteristics: Based on the dual verification of region and case

The first aspect involves regional policy characteristics. A word frequency analysis of policy documents from Jiangsu, Guangdong, Fujian, Zhejiang, and Shandong provinces (as shown in Table 2) reveals that “mechanism,” “industry,” and “funding” are high-frequency terms, reflecting local governments’ emphasis on innovation in governance mechanisms and resource allocation. Notably, Guangdong’s policies feature frequent mentions of “board of directors” and “market-oriented approaches,” demonstrating its strategy to leverage industrial advantages for deeper corporate governance participation. In contrast, Zhejiang’s policies highlight “digitalization” and “standardization,” aligning with the demands of the digital economy sector.

The second is the comparison of typical cases. The governance model of 11 representative industrial colleges was selected for case analysis, and the core characteristics of the governance model are shown in Table 2.

Table 2: List of typical governance modes and characteristics of industrial colleges in Chinese universities

Name of industrial college	The affiliated vocational college	Governance model description	Typical features/case studies
Smart Port Industry College	Qingdao Technological Institute of Harbor	The entity operation mode of deep integration between the university, port, and enterprise	Through collaboration with Shandong Provincial Port Group, the program adopts a “unified campus-port” mechanism. It integrates cutting-edge port equipment (including container gantry cranes and AGV systems) with 12 globally pioneering technologies from Liansteel’s innovation team (such as the “Hydrogen + 5G” automated terminal), creating a seamless integration between classroom learning and port operations. Through concrete operational frameworks, this model ensures sustainable industry-academia collaboration in talent development.
Huawei Information and Network Technology Industry	Shenzhen Polytechnic	The collaborative governance model of school and enterprise	Huawei jointly established a “dual dean” management committee with Shenzhen Polytechnic, jointly formulated training programs, developed courses (such as 5G communication, artificial intelligence), implemented the “dual mentor system” (enterprise engineers + university teachers), jointly built the “HuaweiICT training base”, and cultivated information composite talents to meet the needs of Huawei ecology.
Bosch Automotive Industry Academy	Wuxi Vocational and Technical College	Community governance model of industry-education integration	Bosch (China), Wuxi Vocational College and Jiangsu Automobile Industry Association jointly built the “Automotive Intelligent Technology R&D Center” to focus on the upgrading needs of “electrification, intelligence and networking” in the automotive industry. Students participated in real projects of enterprises (such as new energy vehicle battery testing) to realize the “deep integration of industry, education and chain.”
Hengdian Film and Television Industry College	Jinhua Vocational and Technical College	Cluster linkage governance model	Leveraging Hengdian’s film and television industry cluster (China’s largest film production base) and in collaboration with Hengdian Group and Zhejiang Film and Television Industry Association, the initiative transforms “film shooting sites” into “educational classrooms”. Students participate in prop design and set management for film projects such as “The Wandering Earth 2” and “Full River Red”, cultivating professionals who are both industry-savvy and practically skilled.
Haier Smart Home Industry College	Shandong Vocational and Technical College	Scenario-based education and governance model	Haier Group provides “real smart home scenarios” (such as smart home appliances, whole-house customization), and integrates teaching links (such as “Smart living room design” course). Students can master smart home installation, debugging, and operation skills through “scenario simulation + real projects,” and directly enter Haier ecological enterprises after graduation.
Alibaba Modern Industrial College	Hangzhou Hangzhou Normal University	The talent training mode of “industry-education integration” between school and enterprise	Establish modern management regulations, build the governance mechanism of the board of directors, create an excellent teacher recruitment mechanism, innovate the education model of talent introduction + regular cultivation, and promote the standardization of talent training.
Jewelry Industry College	Guangzhou Panyu Polytechnic	Industry association-dominated governance model	In cooperation with Guangdong Provincial Jewelry and Jade Jewelry Industry Association and Panyu Jewelry Industry Cluster (60% of China’s jewelry exports come from here), the association led the formulation of “jewelry skill standards,” jointly built “jewelry testing center” and “jewelry design workshop” with schools, and students participated in “order-based training” in jewelry enterprises to achieve “employment upon graduation.”
Xinhua Liuhe Industrial College	Jiangsu Vocational College of Agriculture and Technology	University-oriented industry-education integration model	Leveraging the strengths of its “Agriculture and Animal Husbandry Specialization Cluster,” the institution collaborates with New Hope Liuhe Group (a national leader in agricultural and livestock sectors). The school designs core courses such as “Animal Husbandry Technology” and “Feed Formulation Design,” while the company provides practical platforms including “breeding bases” and “feed mills.” This partnership cultivates professionals who are both technically proficient and management-savvy in the agricultural sector.
Guzhen Lighting Academy	Zhongshan Polytechnic	Government-university-enterprise ternary governance model	The Zhongshan Ancient Town Government (core area of the National Lighting Industry Cluster) provides policy support, including financial subsidies and venue provision. Zhongshan Polytechnic collaborates with local lighting enterprises such as Oppl Lighting to establish “Lighting Design” and “Lighting Manufacturing” programs. Students participate in corporate R&D initiatives for new product development, ensuring alignment between industry needs and talent cultivation.
Aviation Maintenance Industry College	Chengdu Vocational and Technical College of Aviation	Military-civilian integration governance model	Leveraging Chengdu’s aviation industry clusters (including AVIC and Sichuan Airlines) and adopting a “military-civilian integration” mechanism, the university has established an “Aviation Maintenance Training Base” equipped with flight simulators and engine testing facilities. Students participate in projects such as “military aircraft maintenance” and “civilian passenger aircraft upkeep,” cultivating aviation maintenance professionals with dual military-civilian applications.
Ant Financial Digital Finance Industry College	Zhejiang Vocational College of Finance	Digital empowerment governance model	Ant Financial (Alipay’s parent company) provides “digital financial technology solutions” (including mobile payments, blockchain, and intelligent risk control systems). In collaboration with Zhejiang Vocational College of Finance, they have established a “Digital Finance Laboratory” offering courses such as “Digital Payment Technology” and “Fintech Applications.” Students participate in the “Ant Financial Merchant Empowerment Program,” cultivating skilled professionals in the digital finance sector.

CONSTRUCTION AND EMPOWERMENT OF GOVERNANCE EVALUATION SYSTEM OF MODERN INDUSTRIAL COLLEGE

Design principles and framework of evaluation index system

Design principles

Systematic principle — covers all elements of the governance process to avoid omissions.

Operational principle — indicators and data are easily accessible, such as “dual-appointment ratio of faculty” and “corporate capital investment ratio”;

Dynamic principle — reserves adjustment space for indicators to adapt to different development stages of industry colleges.

Two indicator frameworks

Based on the “goal-process-result” logic of the governance process, an evaluation system containing 4 secondary indicators and 12 tertiary indicators is constructed, as shown in Table 3. The overall goal of industry college governance is to improve the modernization of governance capacity and cultivate high-quality talents adapted to industrial development.

Table 3: Framework of governance evaluation index system for industrial college

The overall goal of modern industrial college governance			
Governance responsibility	Governance architecture	Governance mechanisms	Governance effectiveness
Teacher construction	Governance system	Management decision	Financial effect
Number of students	Organizational structure	Constrained regulation	Social satisfaction
Personnel training	Division of responsibilities	Distribute incentives	Student recognition

The governance of modern industrial colleges should first clarify the strategic goals, which are consistent with the goals of school-enterprise cooperation, namely, to cultivate high-level talents for the regional economy, integrate resources, improve talent training ability, and clarify development direction.

The strategic objectives can be broken down into four key aspects: First, shared governance responsibilities, which involve faculty development, student selection, and talent cultivation, serving as long-term growth signals and demonstrating social responsibility. Second, an appropriate governance framework that aligns with institutional development through systematic structures and role distribution to enhance efficiency and sustainability. Third, a holistic governance mechanism encompassing

decision-making management, regulatory oversight, interest distribution, and incentive systems—each addressing efficiency, risk mitigation, and participation motivation, respectively. Fourth, effective governance performance is reflected in financial outcomes, social impact, and student satisfaction, demonstrating financial support, societal engagement, and talent development efficiency.

At present, its governance is in the semi-internal mode stage. To implement multi-dimensional collaborative governance, it is necessary to build a program, sort out the general goal and refine it into key indicators, build an evaluation system, and lay the foundation for assigning weights to indicators.

Index connotation and quantitative method

Governance responsibilities

Faculty Development: Proportion of dual-appointed faculty (school-enterprise joint appointments, target ≥ 30%), average student guidance per enterprise mentor;

Student Selection: Enrollment ratio aligned with industry demands, proportion of students interviewed by enterprises;

Talent Cultivation: Curriculum alignment with industrial standards, graduate employment rate in relevant fields.

Governance structure

Governance Systems: Completeness of regulations (including decision-making processes, profit distribution), update frequency;

Organizational Structure: Decision-making hierarchy (single vs multi-level), cross-department coordination mechanisms;

Division of Duties: Clear accountability lists, effective conflict resolution.

Governance mechanisms

Management and Decision-Making: Efficiency in major decisions (average resolution cycle), representation of corporate representatives in decision-making bodies;

Restraint and Oversight: Audit frequency, penalties for violations;

Profit Distribution and Incentives: Clear intellectual property rights, proportion of talent development rewards.

Governance effectiveness

Financial Performance: Resource efficiency (qualified graduates per 10,000 yuan investment), sustained cor-

Table 4: Combination weighting of indicators

Secondary indicators	Weight	Level 3 indicators	Weight
Governance responsibility	34.91%	personnel training	13.9%
		Student selectio	13.2%
		Teacher training	7.81%
Governance effectiveness	25.757%	Social satisfaction	9.7%
		Financial effect	9.8%
		Student recognition	6.257%
Governance mechanisms	25.681%	Managerial decision	14.1%
		Profit distribution	5.3%
		Constrained supervision	6.281%
Governance architecture	9.44%	Division of responsibilities	4.17%
		Organizational structure	3.23%
		Governance system	2.04%

porate commitment duration;

Social Satisfaction: Graduates' evaluation scores (1–5 points), industry association recommendations;

Student Recognition: Practical teaching satisfaction, post-graduation preferred partner companies.

Index weighting method and results

Research methods

The combined weighting method of “improved fuzzy comprehensive evaluation method + entropy value method” is adopted:

Fuzzy comprehensive evaluation method: Subjective weights were obtained through 13 university experts, 4 enterprise executives, and 3 industry representatives' Likert 9-point scale (1 = very unimportant, 9 = very important);

Entropy method: After the score data is truncated at the 1st percentile, the objective weight is calculated through information entropy. The formula is as follows:

Positive indicator normalization:

$$X'_j = \frac{x_j - \min(x_j)}{\max(X_j) - \min(X_j)}$$

Entropy calculation:

$$\varepsilon_j = k \sum P_{ij} \ln(P_{ij}), k = 1/\ln n$$

Weight calculation:

$$\omega_j = \frac{1 - \varepsilon_j}{\sum (1 - \varepsilon_j)}$$

Results of empowerment

The weights of each index after combined weighting are shown in Table 4.

It can be seen that in the overall governance evaluation, governance responsibility accounts for 34.91%, the largest proportion, indicating that the governance evaluation of industry colleges is the top priority. Governance effectiveness and governance mechanism account for an equally large proportion in China, which can effectively support it. Meanwhile, governance structure plays an important role.

PATH SELECTION FOR GOVERNANCE OPTIMIZATION OF MODERN INDUSTRIAL COLLEGES

The analysis demonstrates that governance mechanisms serve as the cornerstone for modern industrial colleges in conducting management and decision-making. Governance responsibilities and organizational structures form the essential foundation for enhancing institutional capabilities, while governance effectiveness directly reflects the college's collaborative efficiency, operational outcomes, and governance quality. To address these requirements, modern industrial colleges should continuously refine their development strategies and implementation pathways, actively establishing a new governance model featuring multi-stakeholder collaboration. This approach will better align with industry demands and elevate their governance efficacy.

Build a multi-resource collaborative integration mechanism

Establishing a “three lists” coordination system

The government has developed three dynamic matching lists – industrial demand lists, university resource lists, and enterprise supply lists – through provincial plat-

forms. For instance, Guangdong Province has transformed key technological requirements in the new energy vehicle industry into talent cultivation indicators, guiding universities to collaborate with enterprises like BYD and GAC in developing integrated curriculum systems.

Build an integrated platform of “industry, education, research and application”

Referring to the experience of the Logistics Industry College of Zhejiang Finance Vocational College, colleges will build a physical platform integrating teaching and training, technology research and development, and enterprise services, promote the two-way flow of “teachers and engineers” (the number of annual exchanges is more than 50), and achieve the equipment utilization rate above 80%.

Improve the multi-subject collaborative decision-making system

Optimize the composition of decision-making organs

Set up a “special seat for industry representatives” in the board of directors or council to ensure that the proportion of enterprise and industry association representatives is not less than 40%, and give them veto power over talent training programs (such as Hangzhou Normal University Alibaba Modern Industry College).

Implement the “hierarchical decision-making” mechanism

At the strategic level, composed of government, universities, and senior executives of enterprises, two meetings are held every year to review the development plan;

The executive level, composed of the dean and the general manager of enterprise HR, holds a meeting once a month to coordinate the implementation of teaching;

The operation layer is composed of professional leaders and enterprise technical backbone, who communicate with each other about teaching details every week.

Improve the closed-loop evaluation of governance efficiency

Build a “three-dimensional” evaluation and feedback mechanism

Enterprise evaluation: submit talent quality assessment report every quarter, accounting for 40% of the weight; Third-party assessment: governance compliance audit conducted by independent institutions every year, accounting for 30% of the weight; Student tracking: career development survey within 3 years after graduation, accounting for 30% of the weight.

Promoting digital governance transformation

The big data platform is introduced to monitor 12 core indicators such as “course matching degree” and “enterprise investment intensity” in real time, and automatically generate early warning reports (such as triggering rectification when an indicator is below the threshold for three consecutive months).

Strengthen the institutional constraints of governance responsibility

Formulate the governance responsibility manual

The 28 specific responsibilities of the government (policy support, supervision and assessment), universities (teaching implementation, quality assurance) and enterprises (resource input, standard output) are included in the cooperation agreement and assessed annually.

Establish an “exit-fill” mechanism

The exit process will be started for the entities that fail to pass the assessment for two consecutive years, and new entities will be attracted through the “white list of industrial colleges” to maintain the vitality of governance (such as the dynamic adjustment mechanism of the Modern Industrial College of Kunming University).

CONCLUSION AND PROSPECT

Through analyzing the evolution of modern industrial college governance models, this study reveals a transition from “university-led” to “multi-stakeholder co-governance,” with governance objectives shifting from “resource complementarity” to “value co-creation.” The established evaluation framework highlights governance responsibilities, mechanisms, and effectiveness as core dimensions. Key indicators such as talent development and management decision-making mechanisms carry significant weight, providing clear guidance for practical optimization.

The research highlights two key contributions: First, it establishes alignment principles between governance models and industrial demands. Second, the combined weighting method enhances the scientific rigor of the evaluation framework. However, limitations remain, including limited sample size and challenges in quantifying indicators like “social satisfaction.” Future work should expand research scope to explore differentiated governance paradigms across various industrial sectors.

The governance optimization of modern industrial colleges is a systematic project that requires institutional innovation to break organizational barriers, realize the deep integration of the education chain, talent chain, and industrial chain, and provide solid talent support for the construction of a manufacturing power.

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Conflict of interest

The authors declare no competing interest.

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