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The Mechanism of Industry-University Integration in Private Universities: A Realistic Multiply Case Study

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Abstract: This study aims to reveal the core mechanisms driving effective industry-education integration in Business Administration programs at private universities in China, and to elucidate the specific mechanisms, contextual conditions, and causes that produce desired outcomes. The research adopts a realist evaluation paradigm and a multiple-case study design, conducting in-depth interviews with four distinct private universities and applying replication logic to construct and refine a "Context-Mechanism-Outcome" (CMO) configuration. It identifies three core mechanisms: collaborative governance, curriculum integration, and a dual-mentor system. These are not universally applicable but, depending on contextual factors like resource endowment and industry traction, combine to form three effective models: high-intensity integration, agile adaptation, and strategic focus.Theoretically, this study advances a contingency theory that shifts the understanding of industry-education integration from a static, universal perspective to a dynamic and context-sensitive one. Practically, the CMO framework serves as a diagnostic tool for designing contextualized strategies, with specific recommendations including the promotion of "lightweight project templates" and a "micro-certificate" system. The originality of this study lies in its application of realist methodology and replication logic to construct a robust causal model for industry-education integration, providing a reform roadmap for resource-constrained private universities—from strategic diagnosis to mechanism design.

Keywords: Private Higher Education Institutions; Industry-Education Integration; Business Administration Education; Case Studies; Realistic Evaluation

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1.Introduction

In the context of the global knowledge economy, the close collaboration between universities and industry, known as the integration of industry and education, has become a national strategy for countries to improve the quality of human capital and drive innovation (Dang et al., 2024; Vuoriainen et al., 2025) . In China, a series of top-down policies explicitly require the higher education system to achieve organic integration of the education chain, talent chain, industrial chain, and innovation chain to meet the urgent needs of industrial upgrading (Guo et al., 2024; Zhuang & Zhou, 2023) . As an important component of China's higher education ecosystem, private universities and their large number of business administration programs face both enormous reform pressure and historical opportunities for differentiated development in this wave (Dang et al., 2024) .

However, a significant gap exists between grand policy narratives and concrete organizational practices. Numerous studies and practices indicate that many university-industry collaborations still remain at a nascent and fragmented stage, such as student internships and that lack systematic planning and long-term sustainability (Dang et al., 2024; Vuoriainen et al., 2025) . The limited depth of corporate involvement fails to reach core aspects of talent cultivation, such as co-developing curricula and co-training faculty. (Vuoriainen et al., 2025) . For private universities already facing challenges in resources, branding, and social recognition, the predicament of this "superficial collaboration" is particularly pronounced.(Dang et al., 2024; Guo et al., 2024) . Therefore, breaking this deadlock and constructing a deep and sustainable industry-education integration model has become a core strategic issue concerning their survival and development (Vuoriainen et al., 2025; Guo et al., 2024) .

Despite providing a valuable foundation for understanding industry-education integration, a critical gap persists in the existing literature. While most previous studies have focused on well-resourced public universities or remained at the level of macro-policy reviews, there has been relatively little in-depth mechanisms analysis of the private university context. (Caputo et al., 2022) . Most importantly, while existing research often focuses on listing "best practices" (the "what") or identifying barriers to collaboration such as a lack of trust and misaligned incentives, it fails to systematically explain the internal mechanisms that drive collaboration from superficial to deep, or the contextual boundaries of these mechanisms (the "how" and "why"). (O'Dwyer et al., 2023; Arranz et al., 2022) . A core barrier is repeatedly mentioned: the widespread lack of fair, effective, and sustainable benefit-sharing mechanisms (O'Dwyer et al., 2023) .

As rational market players, enterprises are fundamentally driven by the prospect of tangible returns when engaging in collaborations. However, when the value proposition is vague and the risks outweigh the benefits, their motivation to participate become constrained (Cantner et al., 2024; O'Dwyer et al., 2023) . this gap underscores the need for a more explanatory theoretical framework to uncover the organizational and relational mechanisms that effectively align incentives, build trust, and co-create value (Czakon et al., 2022; O'Dwyer et al., 2023; Cantner et al., 2024) . This study aims to address this void developing a contingent model that explains the causal logic behind the success and failure of industry-education integration.

Grounded in the identified research gap, this study moves beyond mere description to undertake a diagnostic and explanatory inquiry. Adopting a realist research paradigm, it seeks to answer the following core questions within the context of Business Administration programs in private universities: (1) What are the core mechanisms that drive deep industry-education integration? (2) How do these mechanisms vary across different contexts, such as resource endowments, geographic location, and industry linkages? (3) What are the causal relationships between these contexts, mechanisms, and integration outcomes? By addressing these questions, this study aims to make a dual contribution: theoretically, by constructing a transferable CMO (Context-Mechanism-Outcome) configurational framework to advance the field from universalistic to contingent thinking; and practically, by providing a contextualized and actionable blueprint for institutional reform and decision-making for diverse private universities.

2.Theoretical Framework

To systematically reveal the inherent causal logic of industry-education integration, this study constructs a multi-level theoretical framework that uses the realist evaluation paradigm as its core analytical lens and synthesizes macro-level institutional ecosystem theory with meso-level curriculum design philosophy, which is designed to open the "black box" behind divergent outcomes of integration practices.

2.1 Analysis Lens

The theoretical foundation of this study is the Realist Evaluation methodology and its core analytical tool—the Context-Mechanism-Outcome (CMO) framework. The core question of the Realist methodology is not "Does this project work?", but rather "What works,for whom, under what circumstances, and why?" (Wong et al., 2016; Warren et al., 2022) . It argues that the success or failure of any social project, such as industry-education integration, is not determined by the program activities themselves, but by how specific contexts activate underlying mechanisms, which in turn produce particular outcomes. Its core causal logic can be expressed as: Context (C) + Mechanism (M) = Outcome (O).

Context (C) refers to the background conditions that influence whether a mechanism can be activated. In this study, context includes external factors such as institution resource endowments, local economic structures, and government support

policies, as well as internal conditions like the history and culture of the cooperating parties (Wong et al., 2016; Harris et al., 2024) .

A mechanism (M) denotes the underlying causal force that drives outcome, typically manifested as the reasoning, beliefs, and responses of participants within a program. For example, a fair distribution of benefits (project resources) may activate the belief among corporate managers that "cooperation is mutually beneficial" (mechanism), thereby motivating them to commit more core resources (Rees et al., 2024) .

Outcome (O) encompasses both expected and unexpected effects of a program. These may include graduate employment rate, improvement in students' practical skills, as well as negative results such as the breakdown of cooperation (Wong et al., 2016; Jagosh et al., 2012) .

The introduction of the CMO framework allows this research to move from a simple "input-output" description to constructing a more refined and explanatory contingency theory. Instead of seeking a universally applicable "best practice," it aims to reveal a set of "CMO configuration"that clarify under what conditions different types of industry-education integration strategies can succeed (Warren et al., 2022; Nielsen et al., 2024) .

2.2 Components of CMO configuration

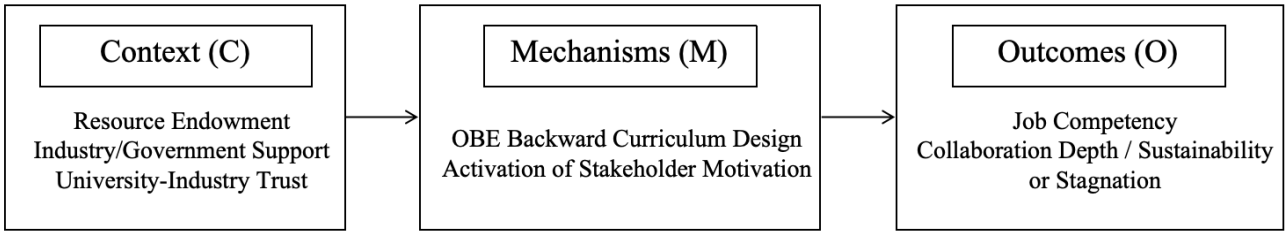
This study employs the Triple Helix Model and Outcome-Based Education (OBE) theory to operationalize the components of the CMO framework.

The Triple Helix Model-capturing the interactions among universities, industry, and government-serves as the core force shaping the macro-context (C) for industry-education integration . Government policy guidance, industry's technological demand and market logic, and higher education institutions' talent development missions collectively form the external conditions that influence whether integration mechanism can be activated (Cai & Lattu, 2022) .

Outcome-based education (OBE) is regarded as a key meso-level mechanism (M). By shifting the educational focus from "teaching inputs" to "learning outcomes" OBE establishes a common "language system" between universities and enterprises. Specifically, the OBE closed loop- centered on "job competency profiles → curriculum mapping → learning outcome evidence portfolios" - functions as an organizational routine that internalizes corporate talent standards into the teaching process (Syeed et al., 2022; Pereira et al., 2024) . The efficacy of this mechanism lies in its provision specific operational focuses and evaluation standards for deep collaboration. This theoretical integration reframes OBE beyond a mere pedagogical concept, reinterpreting it as a boundary object that facilitates cross-boundary collaboration within specific organizational contexts. It provides a common communication platform and collaborative goals for actors from different organizational cultures (academia and industry), thereby activating deeper levels of cooperation (Wlazlak & Säfsten, 2025; Carlile, 2002) .

In summary, guided by the realist evaluation paradigm, this study treats the context (C) - mechanism (M) - outcome (O) configuration as the fundamental causal unit for explaining success and failure in industry-education integration. Specifically, contextual conditions (C) such as the university resource endowment, regional industrial ecosystems, and government initiatives-activate collaborative mechanism (M) between universities and enterprises, ultimately affecting the quality of talent cultivation and the sustainability of cooperation (O). This analytical framework is detailed in Figure 1 .

Figure 1: Realistic CMO Analysis Framework



3.Research Methods

To systematically construct and test the theoretical propositions outlined above, this study adopts a qualitative, multi-case comparative research design. This approach is chosen to facilitate in-depth exploration and systematic comparison, with the

goal of producing theoretical insights capable of analytical generalization.

Research Design. The fundamental objective of this study is to answer the questions of "how" and "why"-specifically, to explore the underlying mechanisms of industry-education integration and the boundary conditions under which they operate. Therefore, a qualitative multi-case study approach is an ideal choice, as it allows for deep investigations within authentic, complex real-world contexts (Eisenhardt, 1989; Eisenhardt & Graebner, 2007) . This study aims not for statistical generalization based on random sampling, but for analytical generalization based on theory (Flyvbjerg, 2006) . The core logic for achieving this is replication logic, not sampling logic (Eisenhardt, 1989; Eisenhardt & Graebner, 2007) . This means the findings will be used to engage with, refine, or expand existing theories. Cases are treated as testing grounds for a series of theoretical propositions.; through systematic cross-case comparison, patterns and mechanisms that transcend the idiosyncrasies of individual cases are identified (Eisenhardt, 1989; Flyvbjerg, 2006) .

Case Selection. Following the replication logic, this study employs a theoretical sampling (or purposive sampling) strategy for case selection (Eisenhardt, 1989; Eisenhardt & Graebner, 2007) . To maximize the potential for theory construction, a maximum variation design is utilized. Four business administration programs from private universities were selected as research cases, based on the key contextual dimensions identified in the aforementioned theoretical framework (Eisenhardt & Graebner, 2007; Valtakoski & Glaa, 2024) . This design enables both literal replication (where similar outcomes are anticipated in cases with similar contexts) and theoretical replication (where different, yet theoretically predictable, outcomes are anticipated in cases with different contexts), thereby strengthening the robustness of the emerging theory and clarifying its boundary conditions (Eisenhardt, 1989; Foster, 2024).

Table 1: Case Introduction and Context Comparison Dimensions

Case	Resources and Environment	Geographical location	Industry traction strength	Core Features Overview
University A	Abundant	Coastal	Strong	Located in a high-tech industrial zone, it has established in-depth partnerships with multiple large technology companies and offers specializations in Digital Marketing and E-commerce.
University B	Constrained	Inland	Weak	Based in a city dominated by traditional manufacturing, it primarily collaborates with small and medium-sized private enterprises, focusing on traditional Production Management and Marketing.
University C	Abundant	Coastal	Weak	Although situated in a developed region, its industry partnerships remain traditional. Collaboration is largely limited to routine internships, with limited exploration of deep integration.
University D	Constrained	Inland	Strong	Leveraging a government-led emerging industrial park, it has formed close ties with a specific industrial chain (e.g., new energy vehicles). Despite limited resources, collaboration is highly focused.

Data Collection and Analysis . The primary data source for this study is semi-structured in-depth interviews. The selection of interviewees follows the principle of "multi-source triangulation," with the samples for each case university encompassing internal personnel, enterprise collaboration partners, and external observers (Dunwoodie et al., 2023; Gioia et al., 2012) . For data analysis, an iterative analysis strategy was employed, where analysis proceeded concurrently and cyclically with data collection (Gioia et al., 2013; Gioia et al., 2022) . The process began with within-case analysis for each individual case to construct its initial CMO chain (Gioia et al., 2022) . This was followed by a cross-case synthesis, utilizing replication logic for theoretical refinement: literal replication helped identify common mechanisms, while theoretical replication revealed how contextual differences moderate these mechanisms (Grimm et al., 2024) . Data collection continued untill theoretical saturation was achieved, indicated when new first-order concepts no longer generate new primary themes or key mechanisms, ultimately leading to the development of a refined integration CMO framework (Dunwoodie et al., 2023; Gioia et al., 2012) .

Research Rigor and Ethical Considerations . To ensure the rigor of the research process and the reliability of the results, this study implemented multiple strategies to uphold the trustworthiness of qualitative research, such as: member checking (Anfara

Jr et al., 2002; Sahakyan, 2023) , establishing a clear audit trail (Anfara Jr et al., 2002) , and employing dual independent coding (Burke et al., 2024) . Concurrently, this study strictly adhered to academic ethical standards. All interviews were conducted only after obtaining informed consent from participants. Furthermore, all collected data were anonymized to protect participants confidentiality (Lewis & Quinnell, 2024) .

4.Research findings

The core finding of this study is that effective industry-education integration is not driven by any single best practice, but rather by different configurations of a set of core mechanisms within a specific context. Unlike the "checklist" approach prevalent in existing literature, this research reveals a deeper causal narrative: why do some resource-constrained universities succeed in industry-education integration, while some well-resourced ones fail? To address this core question, this chapter will first demonstrate, through rigorous data analysis, how three fundamental mechanisms driving deep integration emerged systematically from the interview data. It will then reveal how these mechanisms-moderated by both resource endowment and industry linkage strength-evolve into three distinct pathways to success.

4.1 Deeply Integrated Core

This study strictly adheres to the standards of qualitative research rigor advocated by Gioia et al., constructing a complete data structure through an iterative coding process, from raw data (first-order concepts) to theoretical themes (second-order themes), and finally to overarching constructs (aggregate dimensions). Table 2 visually presents this analytical process. It serves not only as a "roadmap" for subsequent narrative but also as core evidence of the methodological rigor of this research. It clearly demonstrates how the three aggregate dimensions—"Synergistic Governance," "Curriculum Integration," and "Dual-Mentorship"—are grounded in and systematically constructed from the interview data

(i) Synergistic Governance

Collaborative governance mechanisms are the cornerstone of all deep integration practices. As illustrated in Figure 4-1, this aggregate dimension is composed of second-order themes such as "Community Consciousness," "Joint Decision-Making Authority," "Institutionalized Communication Channels," and the "Establishment of Procedural Trust." It provides institutional guarantees for solving the inherent core challenges in university-enterprise cooperation by establishing a joint decision-making platform that transcends the traditional client-vendor relationship and ensures equal rights and responsibilities. For example, a senior executive from a partner company of University A emphasized, "We are not client and contractor; we are a community with a shared future." This quotation vividly embodies the second-order theme of "Community Consciousness." This shift in mindset is a prerequisite for deep collaboration to occur.

The extreme importance of this mechanism is most strikingly highlighted by the failure of Case C. Despite abundant resources, the governance platform at University C was merely symbolic. As one interviewee noted, "meetings were not just for tea and chat"- but substantive dialogue failed to materialize. This resulted in enterprises remaining in the passive role of "resource provider" rather than becoming "co-owner," which directly prevented the activation of deeper collaborative mechanisms. Consequently, the collaboration remained superficial, powerfully demonstrates that synergistic governance is a necessity, not merely a "nice-to-have."

(ii) Curriculum Integration

If synergistic governance establishes the "skeleton" of collaboration, then the integrated curriculum mechanism constitutes the "flesh and blood" that fills it out. This aggregate dimension is built upon second-order themes such as "backward design logic," "visualization of job competency requirements," "precise matching of curriculum and competency," and "outcome-based multi-dimensional assessment." It accomplishes the systematic internalization of corporate talent standards into the teaching process and objectives of the university.

The core operational process of this mechanism is a dynamic closed loop. First, the university and the enterprise jointly develop a "competency profile" for the target job position. As one industry expert stated, "We start by mapping out the exact profile of the ideal candidate for this role, listing each required competency point by point." This process exemplifies the "visualization of job competency requirements." Next, the teaching team employs backward design to construct the curriculum system based on the profile, forming a "curriculum map" to ensure that "every course aligns directly with

this ‘competency map,’ keeping us on track.” Finally, assessment is conducted through a diverse “Portfolio of evidence”-including project reports and enterprise evaluations-shifting the focus from “what was taught” to “what was learned and what can be done.” The efficacy of this mechanism lies in its provision of concrete operational focuses and evaluation criteria for deep bilateral collaboration.

(iii) Dual-Mentor System

A normalized and controlled dual-mentor mechanism is the “last mile” for deepening integration and connecting theory and practice. As shown in Table 2 , its core second-order themes include “Routine and Inclusive Mentorship” and “Quality Control and Incentive Mechanisms.” It aims to embed industry experts throughout the talent development process, facilitating the transfer of tacit knowledge. An effective dual-mentorship system is not a privilege reserved for a few top students, but an institutionalized arrangement-as one program coordinator noted, “Starting from their second year, every student is assigned two mentors.” This ensures the inclusivity and accessibility of mentorship.

More importantly, quality control is crucial. An industry mentor emphasized, “Being a corporate mentor isn’t just an honorary title. We have clear guidance manuals and evaluation criteria.” This reflects the operationalization of the “Quality Control and Incentive Mechanisms.” University D exemplifies this through a “rights–responsibility alignment” system, linking the dispatch of qualified mentors to enterprises’ eligibility for alliance benefits, thereby ensuring commitment and quality.In contrast, the absence of clear incentives and management mechanisms in Case C resulted in low engagement from corporate mentors, ultimately reducing the mechanism to a mere formality. This further underscores the systemic importance of these core mechanisms in achieving meaningful integration.

Table 2: Data Structure of the Core Mechanism of Deep Integration

1st-order concepts (Representative interview Quotations)	2nd-Order Themes (Research-Derived Theoretical Labels)	Aggregation Dimensions
“We are not client and contractor; we are a community with a shared future.” “Meetings were not just for tea and chat—we can actually make final decisions on curriculum budgets.” “Industry partners are deeply involved from the very beginning, starting with the top-level design.”	Community Consciousness Joint Decision-Making Authority Institutionalized Communication Channels Establishment of Procedural Trust	Synergistic Governance
“We start by mapping out the exact profile of the ideal candidate for this role, listing each required competency point by point.” “Every course aligns directly with this ‘competency map’, keeping us on track.” “The final evaluation isn’t based on what the teacher tested, but on the ‘portfolio’ students produce—and whether industry recognizes its value.”	Backward Design Logic Visualization of Job Competency Requirements Precise Curriculum-Competency Alignment Outcome-Based Multi-Method Assessment	Curriculum Integration
“Starting from their second year, every student is assigned two mentors: one from the university and one from the enterprise.” “Being a corporate mentor isn’t just an honorary title. We have clear guidance manuals and evaluation criteria.” “When companies send mentors, we also grant them priority in other collaborative projects.”	Routine and Inclusive Mentorship Quality Control and Incentive Mechanisms Tacit Knowledge Transfer Rights–Responsibilities Alignment	Dual mentor system

4.2 The moderating role of context

The analysis based on theoretical replication further reveals that the core mechanisms identified are not universal tools with fixed forms. Their specific manifestations, combinations, and ultimate effectiveness are profoundly shaped by key contextual factors. This study finds that Resource Endowments and Industry Traction are the two most critical moderating variables. Their varying levels of strength combine to produce three distinct successful models of industry-education integration and one failed model.

Resource Endowment refers to the amount of internal resources that universities have available for industry-education

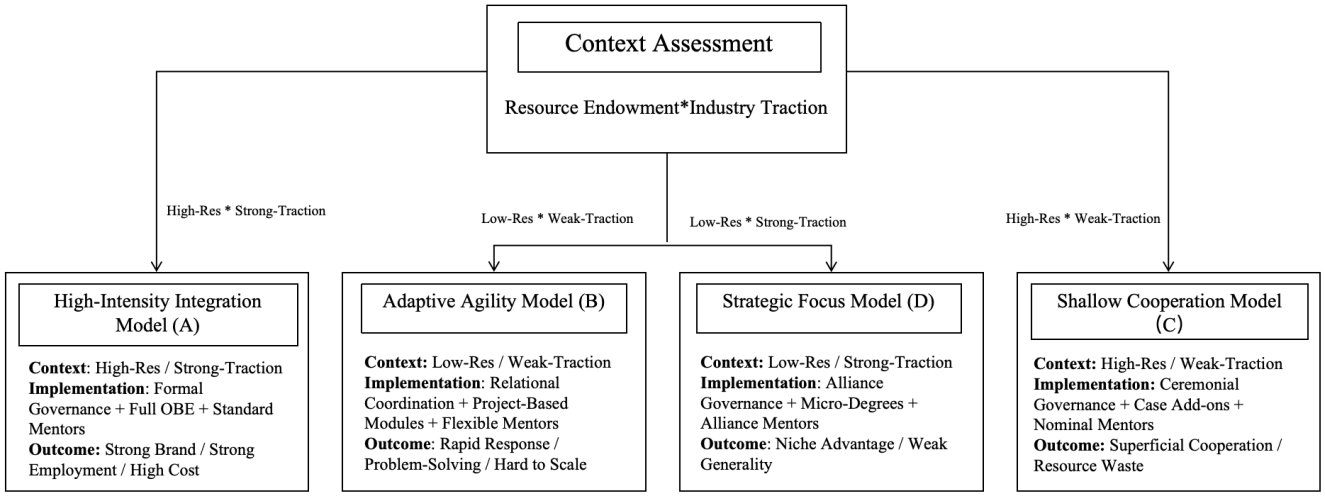
integration, such as financial, human, and brand resources.

Industry Traction denotes the strength of the intrinsic motivation for deep collaboration with universities, driven by factors such as the pace of technological iteration within the partner industry and the scale of its talent gap.

4.3 Contingency Paths for Industry-Education Integration

Different combinations of resource endowments and industry traction shape, constraint, and amplify the three core mechanisms-synergistic governance, curriculum integration, and the dual-mentor system- ultimately resulting in three identifiable and operational successful paths, as well as one typical shallow collaboration path. Specifically, this study identified three effective models: High-Intensity Integration (A), Agile Adaptation (B), and Strategic Focus (D)- alongside one high-risk model, Shallow Collaboration (C). These four models do not simply represent "good or bad" outcome; rather, they reflect viable pathways- demonstrating the principle of Equifinality- under different contextual conditions, as shown in Figure 2.

Figure 2: Contingency Path Model for Industry-Education Integration



(I) High-intensity fusion mode (Case A)

Context (C): Characterized by an ideal setting of abundant resources and strong industry traction. Mechanism (M): This advantageous context activates institutionalized, high-investment «heavy» integration mechanisms. Institution A established a «Strategic Committee» with Global 500 companies, enabling joint decision-making on the curriculum. Ample resources allowed for a systematic OBE curriculum redesign, with detailed intellectual property agreements safeguarding collaborative R&D interests. Outcome (O): This model produces graduates with strong competitiveness in the job market and helps the institution build a distinctive brand identity. However, its high operational costs and relatively rigid processes make it difficult for resource-constrained institutions to replicate.

(II) Agile Adaptive Model (Case B)

Context (C): Marked by a challenging environment of constrained resources and weak industry traction. Mechanism (M): Facing dual constraints of low engagement from large enterprises and limited internal resources (Context C), this context activated a strategy where Institution B›s leaders leveraged personal social capital to create informal governance platforms, such as «Entrepreneur Luncheons» (Mechanism M). Curriculum reform followed a «focused breakthrough» approach, developing «project-based course modules» to lower the participation barrier for SMEs through «short, simple, and fast» collaboration models. Outcome (O): This model effectively enhanced the institution›s capacity to serve the local economy. However, its sustainability is highly dependent on a few key individuals, making it difficult to scale.

(III) Strategic Focus Model (Case D)

Context (C): Defined by a unique scenario of constrained resources but strong industry traction (facilitated by an external industrial cluster). Mechanism (M): Resource constraints (Context C) compelled Institution D to seek external alliances to compensate for its weaknesses. Coordinated by the local government, the school co-established a «Talent Development

Alliance» with multiple firms within the industrial cluster. This alliance-based governance structure, through resource pooling, activated a «rights–responsibilities alignment» mechanism in the dual-mentor system, where firms viewed deep participation in talent development as an «obligation» for receiving policy support. Outcome (O): This model enabled the institution to develop a powerful, hard-to-replicate advantage in talent cultivation for a specific industrial sector. However, its success is highly dependent on the stability of the external industrial ecosystem.

Table 3 : Cross-Case Matrix of CMO Configuration for Industry-Education Integration

Mode Type	Core Context (C)	Adaptive form (M) of the Core Mechanism	Key Results (O)	Representative Case
High-intensity fusion mode	Resources: Abundant Industry-driven: strong	Governance: Institutionalized, formal Strategic Committee Curriculum: Systemic, full-coverage OBE restructuring Mentorship: Well-funded, standardized, and comprehensive system	Graduates exhibit strong job competency; significant joint innovation outcomes. However, entails high operational costs and limited flexibility.	University A
Adaptive Agility Model	Resources: Constrained Industry-driven: Weak	Governance: Informal, relationship-driven communication platforms Curriculum: «Focused-breakthrough» project-based modules Mentorship: Relies on personal commitment and non-material incentives	Enhances the institution's regional service capability and students' practical problem-solving skills. However, faces challenges in sustainability and scalability.	University B
Strategic Focus Model	Resources: Constrained Industry-driven: strong	Governance: Industry cluster-driven alliance governance Curriculum: Highly customized industry micro-programs Mentorship: Collective, obligation-rights aligned system	Cultivates a strong talent cultivation advantage in specific sectors, effectively offsetting resource constraints. However, faces tests in model transferability and developing students' general competencies.	University D
Shallow Cooperation Model	Resources: Abundant Industry-driven: Weak	Governance: Symbolic, formalistic joint meetings Curriculum: Add-on, marginalized case insertions Mentorship: "In-name-only," lacking management and incentives	Maintains basic internship cooperation but fails to enhance talent cultivation quality or institutional branding. Resource advantages are not translated into integration benefits.	University C

5.Conclusion

The central thesis of this study is that effective industry-education integration is not a set of easily replicable "best practices" but a dynamic, context-dependent ecosystem. Its success hinges on whether an institution can identify and cultivate a compatible combination of core mechanisms tailored to its unique context. This chapter situates these findings within the broader scholarly landscape, engages in dialogue with existing theory to elaborate their theoretical contributions, and develops a diagnostic framework for practice and policy.

5.1 Theoretical Contributions

This study's primary theoretical contribution is to advance University-Industry Collaboration (UIC) research beyond a quest for universal "success factors." It shifts the focus from a "variable-oriented logic" to a "configuration-oriented logic" that emphasizes equifinality and context-dependence. By constructing a contingent model based on CMO configurations, it challenges the linear, additive assumptions implicit in prior efforts to compile checklists of success elements. The discovery of three distinct yet equally effective integration pathways demonstrates that success is not additive but configurational—achievable through entirely different "recipes." This provides a novel equifinality perspective for UIC research.

Second, integrating Resource Dependence Theory (RDT) and Institutional logics perspectives provides a deeper causal explanation for this contingent model. We argue that the heightened resource dependence of private universities (an RDT

lens) furnishes the fundamental motive for collaboration, while the conflict between "academic logic" and "market logic"—stemming from their embeddedness in different institutional fields—constitutes the core dilemma. Within this framework, core mechanisms like "synergistic governance" are revealed as micro-level solutions crafted by organizations to manage external dependencies and resolve logic conflicts. This provides the crucial micro-foundation for understanding how macro-level institutional models like the Triple Helix are operationalized at the organizational level.

Finally, the study further illuminates the specific operational dynamics of these micro-solutions. Taking the "curriculum integration" mechanism as an example, we reconceptualize its core output (e.g., the "job competency profile") as a boundary object. By providing a shared focus for collaboration endowed with "interpretive flexibility," it bridges the communication gap between academics and practitioners belonging to different "thought worlds," facilitating effective knowledge translation rather than mere transfer. This finding deepens our understanding of the social properties of knowledge-sharing tools in cross-organizational collaboration.

5.2 Implications for Practice and Policy

Table 4 : Contingency Optimization Strategy Framework for Multiple Stakeholders

Stakeholders	Core challenges	Optimization strategy recommendations
University Administrators	Insufficient internal incentives lead to a fragmented drive for reform; the curriculum is rigid and out of touch with industry; and teachers lack practical skills.	Strategic diagnosis: First, locate your position in the "resource-traction" matrix. High-intensity scenario: Establish a physical collaborative office and incorporate the effectiveness of industry-education integration into the core evaluation system for teachers. Agile adaptation to the situation: Empower front-line teachers and department leaders by granting them the autonomy to develop "lightweight projects" and establishing special rewards. Strategic Focus Context: Concentrate the resources of the entire college to connect with the core industry chain and establish a "dual" teacher development path.
Enterprise	There is insufficient motivation to participate and a vague sense of value; cooperation remains superficial, with no willingness to invest core resources; and the barriers to participation are high for SMEs.	Value proposition design: Shift from accepting internships to co-creating courses and co-evaluating projects, providing a clear menu of shared benefits. SME Solution: Vigorously promote the standardized "4-6 Week Lightweight Project" template, focusing on solving a specific, small-scale management problem to achieve low cost and quick returns. Large enterprise solutions: Promote the joint construction of joint laboratories and data sandboxes, and jointly apply for research and development projects.
Government/Industry Association	Lack of targeted policy support and incentives; information asymmetry and difficulty in sharing resources; legal and compliance risks in cooperation.	Institutional supply: Establish special funds/tax incentives that match the integration model; take the lead in establishing regional or industry-specific "micro-certificate" certification systems and credit recognition standards. Platform establishment: Following the example of Case D, establish a cross-university "industry-college alliance" in key industrial sectors, providing start-up funds and a shared platform.

The CMO framework developed in this study holds not only theoretical value but can also be translated into an actionable framework for multiple stakeholders, serving both diagnostic and guiding functions. Its core principle is to emphasize that any effective improvement strategy must begin with an accurate diagnosis of one's own context. Guided by this principle, the framework provides institutional administrators with a strategic diagnostic tool (see Table 4), helping them pinpoint their position within the two-dimensional matrix formed by "Resource Endowments" and "Industry Traction." Consequently, the first step of reform shifts from blindly adopting external "best practices" to initiating change based on scientific self-positioning. This diagnostic outcome directly reveals the most suitable strategic pathway and the combination of mechanisms that need to be prioritized for cultivation.

5.3 Limitations and Future Research Directions

As an exploratory qualitative study, this research has some limitations, which also point the way for future research.

First, the cases in this study are concentrated primarily in Business Administration programs. Future research should apply this CMO framework to a wider range of disciplines (e.g., engineering, design) and conduct broader cross-regional comparisons to test and extend the theory's generalizability.

Second, this study employs a cross-sectional design, which limits the ability to capture the dynamic evolution of collaborative relationships over time. Future research could adopt longitudinal case study methods to delve deeper into how trust is gradually built, how mechanisms evolve, and how organizations transition between different integration models.

Third, this study constructs a theoretical framework using qualitative methods. Building upon this foundation, future work could develop scales to measure the relevant constructs and employ large-scale surveys to quantitatively test the variable relationships proposed in the CMO framework, thereby achieving complementarity between qualitative findings and quantitative validation.

Finally, the core mechanisms identified in this study—Synergistic Governance and Curriculum Integration as a boundary object—likely have applicability beyond the specific context of industry-education integration. They may be relevant to any cross-sector collaboration scenario that requires bridging institutional logic boundaries (e.g., collaborations between NGOs and corporations, research partnerships between hospitals and universities, etc.). Future research could test the applicability of this study's core mechanisms and CMO configurational logic to other types of cross-organizational collaboration. This would significantly broaden the potential impact of this research and open up a more exciting research agenda.

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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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