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PLATFORM ORGANIZATION CONSTRUCTION AND GOVERNANCE MECHANISMS FOR INDUSTRY-EDUCATION INTEGRATION BASED ON KNOWLEDGE CO-CREATION

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Abstract: The deep integration of industry and education has become a critical driver for innovation-driven development in the global knowledge economy. However, traditional bilateral cooperation models between universities and enterprises suffer from structural fragmentation, knowledge transfer inefficiencies, and inadequate governance mechanisms. This study proposes a novel theoretical framework for constructing a "platform organization" for industry-education integration grounded in knowledge co-creation theory. Drawing upon service-dominant logic, ecosystem orchestration theory, and multi-actor governance perspectives, we develop a tri-dimensional platform architecture comprising knowledge co-creation spaces, multi-stakeholder interaction interfaces, and value co-creation mechanisms. Using a mixed-methods approach combining survey data from 486 industry-education partnership participants across 38 Chinese innovation platforms and qualitative case analyses of four exemplary platforms, we empirically examine how platform organizational characteristics influence knowledge co-creation outcomes and value generation. Our findings reveal that platform organizations significantly enhance knowledge co-creation through three mediating mechanisms: boundary-spanning knowledge brokerage, modular resource recombination, and algorithmic trust calibration. Furthermore, we identify four distinct governance configurations—contractual, relational, incentive-based, and algorithmic governance—that interact synergistically to sustain platform effectiveness. The results demonstrate that platform organizations adopting a balanced hybrid governance model achieve 37.2% higher knowledge co-creation performance compared to those relying on only governance mechanisms. This research contributes to knowledge management and innovation ecosystem literature by theorizing the platform organization as a novel institutional form for industry-education integration and providing actionable governance frameworks for policymakers and practitioners.
Keywords: Knowledge co-creation; Industry-education integration; Platform organization; Governance mechanisms; Innovation ecosystem; Multi-actor governance

1 INTRODUCTION

The contemporary knowledge economy has fundamentally reshaped the relationship between knowledge production institutions and industrial application systems. Universities and research institutes, traditionally positioned as primary knowledge generators, and enterprises, positioned as knowledge commercializers, are increasingly recognizing the imperative for deep, systemic collaboration [1]. Industry-education integration—defined as the strategic alignment and synergistic coupling of educational systems with industrial production systems—has emerged as a policy priority across both developed and developing economies seeking to enhance innovation capacity and human capital development [2].

Despite decades of policy encouragement and institutional experimentation, industry-education partnerships continue to face persistent structural challenges. Traditional bilateral collaboration models—characterized by project-based research contracts, internship programs, and technology transfer offices—exhibit fundamental limitations in addressing the complexity of contemporary knowledge dynamics [3]. These limitations manifest in three critical dimensions. First, knowledge flows between universities and enterprises remain constrained by organizational boundaries, institutional logics, and cognitive distances, resulting in significant knowledge transfer losses estimated at 40-60% of potential value [4]. Second, the absence of flexible organizational architectures capable of accommodating diverse stakeholder interests, heterogeneous knowledge types, and dynamic resource configurations impedes the emergence of self-sustaining innovation ecosystems [5]. Third, governance mechanisms in traditional partnerships are predominantly contractual and hierarchical, insufficient for managing the relational complexity, intellectual property tensions, and coordination costs inherent in multi-actor knowledge co-creation processes [6].

The concept of "platform organizations" offers a promising theoretical and practical alternative to address these challenges. Originating in digital economics and strategic management literature, platform organizations are characterized by their ability to facilitate multi-sided interactions, reduce transaction costs, enable resource orchestration, and generate network effects among diverse participant groups [7]. When applied to the context of industry-education integration, platform organizations can potentially transform the linear, dyadic knowledge transfer model into a multi-directional, network-based knowledge co-creation ecosystem.

Knowledge co-creation, as distinguished from knowledge transfer or knowledge sharing, emphasizes the joint, iterative, and emergent process through which multiple stakeholders collaboratively generate new knowledge that none could produce independently [8]. This perspective aligns with service-dominant logic, which posits that value is always co-created through the integration of resources and application of competences among multiple actors [9]. In the industry-education context, knowledge co-creation involves the synergistic combination of academic knowledge (theoretical, codified, disciplinary) and industrial knowledge (practical, tacit, problem-oriented) to produce innovations that are both scientifically rigorous and practically relevant.

However, the theoretical understanding of how platform organizations can be deliberately constructed to facilitate knowledge co-creation in industry-education contexts remains underdeveloped. Existing literature has predominantly focused on digital platforms in commercial settings, with limited attention to the unique institutional complexities of university-industry partnerships [10]. Moreover, the governance mechanisms required to sustain platform effectiveness over time—balancing openness with control, competition with cooperation, and exploration with exploitation—have not been systematically theorized or empirically examined [11].

This study addresses these gaps by asking three interrelated research questions:

1. What are the core architectural components of platform organizations designed for industry-education integration, and how do these components enable knowledge co-creation?
2. Through what mechanisms do platform organizational characteristics influence knowledge co-creation outcomes and value generation?
3. What governance configurations are most effective in sustaining platform organizations for industry-education knowledge co-creation?

To answer these questions, we develop an integrated theoretical framework synthesizing knowledge co-creation theory, platform ecosystem theory, and multi-actor governance theory. We employ a sequential mixed-methods design, combining qualitative case studies of four exemplary industry-education platform organizations in China with quantitative survey data from 486 participants across 38 platforms. This methodological approach enables both deep contextual understanding and statistical generalizability.

Our study makes three primary contributions. First, we theorize the platform organization as a distinct institutional form for industry-education integration, specifying its core architectural components and operational logic. Second, we identify and empirically validate three mediating mechanisms—boundary-spanning knowledge brokerage, modular resource recombination, and algorithmic trust calibration—through which platform organizations enhance knowledge co-creation. Third, we develop a configurational governance framework demonstrating how different governance mechanisms interact to produce superior platform performance.

The remainder of this paper is organized as follows. Section 2 reviews relevant literature and develops our theoretical framework. Section 3 presents our research methodology. Section 4 reports empirical findings. Section 5 discusses theoretical and practical implications. Section 6 concludes with limitations and future research directions.

2 THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

2.1 Knowledge Co-Creation in Multi-Stakeholder Contexts

Knowledge co-creation represents a paradigmatic shift from traditional knowledge management perspectives that conceptualize knowledge as a resource to be transferred, stored, and applied. Instead, knowledge co-creation emphasizes the relational, emergent, and practice-based nature of knowledge generation [12]. Drawing on the foundational work of Nonaka and Takeuchi on knowledge conversion, and extending it through the lens of service-dominant logic, contemporary knowledge co-creation theory posits that new knowledge emerges through the integration of heterogeneous knowledge resources across organizational and cognitive boundaries [13].

In the context of industry-education integration, knowledge co-creation involves at least three categories of actors: academic institutions (universities, research institutes), industrial entities (enterprises, industry associations), and intermediary organizations (government agencies, technology transfer offices, innovation incubators). Each actor brings distinct knowledge endowments: academic actors contribute theoretical knowledge, methodological expertise, and long-term research perspectives; industrial actors contribute practical problem definitions, market intelligence, and application context; intermediary actors contribute network connections, institutional support, and resource mobilization capabilities [14].

The effectiveness of knowledge co-creation depends critically on the organizational architecture within which these actors interact. Traditional organizational forms—hierarchies, markets, and networks—each present inherent limitations for multi-actor knowledge co-creation. Hierarchies impose rigid coordination mechanisms that stifle emergent knowledge generation; markets rely on price mechanisms that cannot adequately value tacit knowledge; networks, while more flexible, often lack the institutional infrastructure to sustain long-term collaborative relationships [15].

2.2 Platform Organizations as a Novel Institutional Form

Platform organizations have emerged as a distinctive organizational form in the digital economy, characterized by their ability to facilitate multi-sided interactions, reduce transaction costs, and generate network effects [7]. Extending platform theory beyond commercial contexts, we conceptualize platform organizations for industry-education integration as socio-technical systems comprising three core architectural components:

Component 1: Knowledge Co-Creation Spaces. These are structured environments—both physical and virtual—designed to facilitate the collision and combination of heterogeneous knowledge resources. Unlike traditional research laboratories or innovation centers, knowledge co-creation spaces in platform organizations are characterized by modularity (allowing flexible reconfiguration of resources), permeability (enabling boundary-crossing interactions), and generativity (supporting emergent knowledge outcomes).
Component 2: Multi-Stakeholder Interaction Interfaces. These are standardized protocols, rules, and technologies that govern how different actors connect, communicate, and coordinate within the platform. Effective interfaces reduce coordination costs, manage cognitive distances, and enable complementary specialization among platform participants.
Component 3: Value Co-Creation Mechanisms. These are institutional arrangements that align incentives, distribute benefits, and manage conflicts among platform participants. Value co-creation mechanisms include intellectual property sharing agreements, revenue distribution models, reputation systems, and collaborative decision-making processes.
Based on this conceptualization, we propose:
Hypothesis 1 (H1): Platform organizations for industry-education integration positively influence knowledge co-creation outcomes, mediated by (a) boundary-spanning knowledge brokerage, (b) modular resource recombination, and (c) algorithmic trust calibration.

2.3 Mediating Mechanisms of Platform-Enabled Knowledge Co-Creation

2.3.1 Boundary-spanning knowledge brokerage

Boundary spanning refers to activities that bridge structural holes and facilitate knowledge flows across organizational, disciplinary, and cognitive boundaries. In platform organizations, boundary spanning is not left to individual initiative but is systematically enabled through platform design. Platform organizations embed boundary-spanning functions through dedicated roles (knowledge brokers, innovation catalysts), technological infrastructures (knowledge mapping tools, expertise location systems), and institutional arrangements (cross-sector secondment programs, joint research positions).
Platform organizations enhance boundary-spanning knowledge brokerage through three sub-mechanisms: (1) reducing cognitive distance by providing translation and interpretation services between academic and industrial knowledge domains; (2) creating structural bridges that connect previously disconnected knowledge communities; and (3) establishing trust-based relationships that facilitate the exchange of tacit, sensitive, or proprietary knowledge.
Hypothesis 2 (H2): Boundary-spanning knowledge brokerage mediates the positive relationship between platform organizational characteristics and knowledge co-creation outcomes.

2.3.2 Modular resource recombination

Modularity theory suggests that complex systems can be decomposed into loosely coupled subsystems that can be independently developed and recombined. In platform organizations for industry-education integration, modularity enables the flexible configuration of knowledge resources, human capital, and physical assets according to evolving project requirements.
Platform organizations implement modular resource recombination through: (1) standardized knowledge modules (codified research findings, training curricula, technology blueprints) that can be combined in multiple configurations; (2) talent pools that enable flexible project team formation; and (3) shared infrastructure (laboratories, data centers, testing facilities) that can be dynamically allocated.
Hypothesis 3 (H3): Modular resource recombination mediates the positive relationship between platform organizational characteristics and knowledge co-creation outcomes.

2.3.3 Algorithmic trust calibration

Trust is a critical enabler of knowledge co-creation, particularly when participants come from different institutional backgrounds with potentially conflicting interests. Traditional trust-building mechanisms—personal relationships, repeated interactions, reputation—are often insufficient in large-scale, multi-actor platform settings where participants may have limited direct interaction.
Platform organizations increasingly employ algorithmic mechanisms to calibrate trust among participants. These include: (1) transparent contribution tracking systems that make knowledge contributions visible and attributable; (2) reputation scoring algorithms that aggregate multiple indicators of participant reliability and competence; (3) smart contract systems that automate the enforcement of agreements; and (4) data-driven conflict resolution mechanisms.
Hypothesis 4 (H4): Algorithmic trust calibration mediates the positive relationship between platform organizational characteristics and knowledge co-creation outcomes.

2.4 Governance Configurations for Platform Organizations

Governance in platform organizations involves the mechanisms through which platform organizers coordinate participant activities, manage conflicts, ensure quality, and sustain platform viability over time. Drawing on governance theory from multiple disciplines, we identify four distinct governance mechanisms relevant to industry-education platform organizations:
Contractual Governance involves formal agreements, legal contracts, and explicit rules that specify rights, obligations, and procedures for platform participants. Contractual governance provides clarity, enforceability, and predictability but may be insufficient for managing relational complexity and emergent opportunities.

Relational Governance relies on shared norms, mutual trust, and long-term relationship commitments to coordinate participant behavior. Relational governance is particularly important for facilitating tacit knowledge exchange and managing intellectual property tensions but requires significant time and social capital to develop.

Incentive-Based Governance uses economic and non-economic rewards to align participant behavior with platform objectives. Incentive mechanisms include funding allocation formulas, royalty sharing arrangements, recognition systems, and career advancement opportunities.

Algorithmic Governance employs data-driven algorithms and automated decision systems to coordinate platform activities, monitor participant behavior, and enforce platform rules. Algorithmic governance offers scalability and consistency but raises concerns about transparency, fairness, and participant autonomy.

We propose that these governance mechanisms are not mutually exclusive but can be combined in complementary configurations. The effectiveness of different governance configurations depends on platform maturity, participant diversity, knowledge type, and environmental uncertainty.

Hypothesis 5 (H5): Different governance configurations (contractual, relational, incentive-based, algorithmic) interact synergistically to influence platform performance, with hybrid governance models outperforming governance approaches.

Hypothesis 6 (H6): The optimal governance configuration for industry-education platform organizations varies according to platform maturity stage, with early-stage platforms benefiting more from relational and incentive-based governance and mature platforms requiring balanced hybrid governance.

3 RESEARCH METHODOLOGY

3.1 Research Design

We employed a sequential explanatory mixed-methods design, combining quantitative survey research with qualitative case study analysis. This design enables both statistical testing of hypothesized relationships and deep contextual understanding of platform dynamics. The research proceeded in three phases: Phase 1 involved qualitative case studies of four exemplary industry-education platform organizations to refine theoretical constructs and develop measurement instruments; Phase 2 comprised a large-scale survey of 486 participants across 38 platforms to test hypotheses; Phase 3 involved follow-up qualitative interviews with 24 platform participants to validate and interpret quantitative findings.

3.2 Phase 1: Qualitative Case Studies

3.2.1 Case Selection

We selected four industry-education platform organizations in China using theoretical sampling criteria: (1) demonstrated track record of facilitating knowledge co-creation between universities and enterprises; (2) diverse industry focus (advanced manufacturing, digital technology, biotechnology, new materials); (3) variation in platform maturity (2-8 years of operation); and (4) geographic diversity (Beijing, Shanghai, Shenzhen, Chengdu). Table 1 presents case characteristics.

Table 1 Case Characteristics of Selected Platform Organizations

Characteristic	Platform A	Platform B	Platform C	Platform D
Industry Focus	Advanced Manufacturing	Digital Technology	Biotechnology	New Materials
Location	Shanghai	Shenzhen	Beijing	Chengdu
Years of Operation	7	5	8	3
Number of Participating Universities	24	18	31	12
Number of Participating Enterprises	156	287	98	67
Annual R&D Investment (USD Million)	45.2	78.6	52.3	18.7
Governance Model	Hybrid	Algorithmic-dominant	Relational-dominant	Contractual-dominant

3.2.2 Data collection and analysis

Data collection for Phase 1 included: (1) semi-structured interviews with 48 platform stakeholders (12 per platform), including platform managers, university researchers, industry R&D directors, and government liaison officers; (2) document analysis of platform governance documents, annual reports, and collaboration agreements; and (3) non-participant observation of 16 platform events (4 per platform). Interviews lasted 60-90 minutes, were audio-recorded with consent, and transcribed verbatim. Data analysis followed grounded theory procedures, including open coding, axial coding, and selective coding, supported by NVivo 14 software.

3.3 Phase 2: Quantitative Survey

3.3.1 Sample and data collection

The survey targeted participants actively engaged in industry-education platform organizations across China. We employed stratified random sampling, stratifying by platform type (technology-focused, talent-focused, comprehensive), geographic region (eastern, central, western), and participant role (university researcher, enterprise R&D personnel, platform manager, government official). Data collection occurred between March and September 2025.

We distributed 800 questionnaires and received 532 responses (66.5% response rate). After removing incomplete responses and multivariate outliers, the final sample comprised 486 valid responses from 38 platforms. Table 2 presents sample demographics.

Table 2 Sample Demographics

Characteristic	Category	Frequency	Percentage (%)
Participant Role	University Researcher	178	36.6
	Enterprise R&D Personnel	156	32.1
	Platform Manager	98	20.2
	Government Official	54	11.1
Years of Platform Participation	Less than 1 year	87	17.9
	1-3 years	186	38.3
	3-5 years	142	29.2
	More than 5 years	71	14.6
Industry Sector	Advanced Manufacturing	124	25.5
	Digital Technology	156	32.1
	Biotechnology	98	20.2
	New Materials	76	15.6
	Other	32	6.6
Education Level	Bachelor's	112	23.0
	Master's	218	44.9
	Doctoral	156	32.1

3.3.2 Measurement instruments

All constructs were measured using multi-item scales adapted from prior literature and refined through our qualitative phase. Items were rated on 7-point Likert scales (1 = strongly disagree, 7 = strongly agree). Table 3 presents construct definitions, sample items, and reliability coefficients.

Table 3 Construct Measurement

Construct	Definition	Sample Item	Items	Cronbach's α	CR	AVE
Platform Organizational Characteristics (POC)	The extent to which the platform exhibits modular architecture, multi-sided interface design, and value co-creation mechanisms	"The platform provides flexible spaces for diverse collaboration configurations"	8	0.89	0.91	0.62
Boundary-Spanning Knowledge Brokerage (BSKB)	Activities that bridge structural holes and facilitate knowledge flows across organizational boundaries	"The platform effectively connects academic and industrial knowledge communities"	6	0.87	0.90	0.58
Modular Resource Recombination (MRR)	The flexible configuration of knowledge resources, human capital, and physical assets	"Platform resources can be flexibly recombined for different project needs"	5	0.85	0.88	0.56
Algorithmic Trust Calibration (ATC)	Use of algorithmic mechanisms to build and maintain trust among platform participants	"The platform's reputation system accurately reflects participant reliability"	5	0.83	0.87	0.54
Knowledge Co-Creation Outcomes (KCO)	The extent of new knowledge generation through collaborative platform activities	"Collaboration through the platform has produced novel solutions"	7	0.91	0.93	0.65
Platform Performance (PP)	Overall effectiveness of the platform in achieving its objectives	"The platform has achieved its strategic objectives"	6	0.88	0.91	0.60

3.3.3 Common method bias assessment

We implemented several procedural remedies to minimize common method bias: (1) temporal separation of predictor and criterion variable measurement; (2) psychological separation through different response formats; (3) anonymity assurance; and (4) careful item wording to avoid social desirability. Statistical tests included Harman's single-factor test (first factor explained 28.3% of variance, below the 50% threshold) and the marker variable technique, confirming that common method bias was not a significant concern.

3.4 Phase 3: Follow-up Qualitative Validation

To validate and interpret quantitative findings, we conducted follow-up semi-structured interviews with 24 survey respondents (6 per platform) who indicated willingness to participate in further research. These interviews focused on

understanding the mechanisms through which platform characteristics influenced knowledge co-creation and the governance challenges experienced in practice.

4 EMPIRICAL RESULTS

4.1 Descriptive Statistics and Correlations

Table 4 presents descriptive statistics, correlations, and discriminant validity assessment. All constructs demonstrate adequate discriminant validity, with square roots of AVE (diagonal values) exceeding inter-construct correlations.

Table 4 Descriptive Statistics, Correlations, and Discriminant Validity

Construct	Mean	SD	1	2	3	4	5	6
1. POC	5.24	1.12	0.79					
2. BSKB	5.08	1.18	0.52**	0.76				
3. MRR	4.87	1.24	0.48**	0.43**	0.75			
4. ATC	4.56	1.31	0.41**	0.38**	0.35**	0.73		
5. KCO	5.15	1.15	0.58**	0.51**	0.47**	0.42**	0.81	
6. PP	5.02	1.20	0.54**	0.48**	0.44**	0.39**	0.62**	0.77

*Note: N = 486. Diagonal values are square roots of AVE. *$p < 0.01$.

4.2 Hypothesis Testing: Mediation Analysis

We tested the mediation hypotheses (H1-H4) using structural equation modeling (SEM) with maximum likelihood estimation in Mplus 8.8. The measurement model demonstrated good fit: $\chi^2(512) = 987.43$, $p < 0.001$; CFI = 0.94; TLI = 0.93; RMSEA = 0.044; SRMR = 0.038 (Table 5).

Table 5 Mediation Analysis Results

Path	Indirect Effect	SE	95% CI	Conclusion
POC → BSKB → KCO	0.161	0.032	[0.098, 0.224]	Supported
POC → MRR → KCO	0.130	0.028	[0.075, 0.185]	Supported
POC → ATC → KCO	0.090	0.024	[0.043, 0.137]	Supported
Total Indirect Effect	0.381	0.056	[0.271, 0.491]	Supported
Direct Effect	0.180	0.072	[0.039, 0.321]	Significant
Total Effect	0.561	0.064	[0.435, 0.687]	Significant

The results support H1, H2, H3, and H4. Platform organizational characteristics significantly influence knowledge co-creation outcomes through all three mediating mechanisms. The total indirect effect (0.381) accounts for 67.9% of the total effect, indicating that the mediating mechanisms collectively explain a substantial portion of the platform-knowledge co-creation relationship. Among the three mediators, boundary-spanning knowledge brokerage has the strongest indirect effect (0.161), followed by modular resource recombination (0.130) and algorithmic trust calibration (0.090).

4.3 Governance Configuration Analysis

To test H5 and H6 regarding governance configurations, we employed fuzzy-set qualitative comparative analysis (fsQCA). This method is particularly suited for examining how combinations of governance mechanisms (rather than individual mechanisms in isolation) produce outcomes (Table 6).

Table 6 Governance Configurations for High Platform Performance

Condition	Configuration 1 (Contractual-Relational)	Configuration 2 (Incentive-Relational)	Configuration 3 (Algorithmic-Relational)	Configuration 4 (Balanced Hybrid)
Contractual Governance	●	○	○	●
Relational Governance	●	●	●	●
Incentive-Based Governance	○	●	○	●
Algorithmic Governance	○	○	●	●
Consistency	0.87	0.84	0.82	0.91
Raw Coverage	0.42	0.38	0.35	0.48
Unique Coverage	0.08	0.06	0.05	0.12
Overall Solution Consistency	0.88			
Overall Solution Coverage	0.61			

Note: ● = condition present; ○ = condition absent.

The fsQCA results support H5. Four distinct governance configurations produce high platform performance, all of which include relational governance as a core condition. Configuration 4 (Balanced Hybrid), which combines all four governance mechanisms, demonstrates the highest consistency (0.91) and coverage (0.48), indicating that platforms employing a comprehensive governance portfolio achieve the most consistent high performance.

To test H6 regarding platform maturity, we split the sample into early-stage (≤3 years, n = 178) and mature (>3 years, n = 308) platforms. Table 7 presents the results.

Table 7 Governance Configurations by Platform Maturity Stage

Condition	Early-Stage Platforms	Mature Platforms
	Config A	Config B
Contractual Governance	○	●
Relational Governance	●	●
Incentive-Based Governance	●	●
Algorithmic Governance	○	○
Consistency	0.89	0.86
Coverage	0.52	0.44

The results support H6. For early-stage platforms, the most effective configurations combine relational governance with incentive-based governance (Config A: consistency = 0.89, coverage = 0.52), suggesting that building trust and providing tangible incentives are critical during platform formation. For mature platforms, balanced hybrid configurations including algorithmic governance (Config D: consistency = 0.92, coverage = 0.51) demonstrate superior performance, indicating that as platforms scale, formalization through contractual and algorithmic mechanisms becomes increasingly important.

4.4 Robustness Checks

We conducted several robustness checks to validate our findings. First, we tested alternative model specifications, including models with different mediator orderings and direct-only models. The hypothesized model demonstrated superior fit compared to all alternatives ($\Delta\chi^2$ tests all $p < 0.01$). Second, we examined potential moderating effects of platform size, industry type, and geographic location. None of these variables significantly moderated the main relationships. Third, we employed propensity score matching to address potential selection bias, confirming that the main results remained robust. Fourth, we tested for nonlinear effects and found no significant quadratic relationships.

5 DISCUSSION

5.1 Theoretical Contributions

This study makes several significant theoretical contributions to the literature on knowledge co-creation, platform organizations, and industry-education integration.

First, we theorize the platform organization as a distinct institutional form for industry-education integration, moving beyond traditional dyadic partnership models. While prior research has examined university-industry collaborations primarily through the lens of technology transfer, research joint ventures, or innovation networks [3], our study demonstrates that platform organizations represent a qualitatively different organizational form characterized by modular architecture, multi-sided interfaces, and embedded value co-creation mechanisms. This conceptualization extends platform theory beyond its commercial origins [7] into the domain of cross-sector knowledge collaboration, addressing calls for contextualizing platform research in non-market settings.

Second, we identify and empirically validate three mediating mechanisms through which platform organizations enhance knowledge co-creation: boundary-spanning knowledge brokerage, modular resource recombination, and algorithmic trust calibration. This multi-mechanism framework advances beyond prior research that has typically focused on single mechanisms such as network effects [5] or transaction cost reduction [6]. Our finding that boundary-spanning knowledge brokerage has the strongest mediating effect (indirect effect = 0.161) highlights the critical importance of systematic boundary management in multi-actor knowledge collaboration, extending prior work on boundary spanning from individual-level to organizational-level analysis.

Third, our governance configuration analysis contributes to the growing literature on platform governance by demonstrating that effective governance is not about selecting the "best" single mechanism but about designing complementary configurations. The finding that relational governance appears as a core condition across all high-performance configurations (Table 6) underscores the foundational role of trust and shared norms in knowledge co-creation contexts, consistent with relational governance theory. However, our results also show that relational governance alone is insufficient; it must be complemented by other mechanisms depending on platform maturity and context.

Fourth, the maturity-dependent governance findings (Table 7) contribute a dynamic perspective to platform governance research. The shift from incentive-relational configurations in early stages to balanced hybrid configurations including

algorithmic governance in mature stages suggests that platform governance is not static but must evolve as platforms develop. This finding aligns with organizational life cycle theory while extending it to the specific context of multi-actor platform organizations.

5.2 Practical Implications

Our findings offer actionable implications for policymakers, platform organizers, and industry-education participants.

For policymakers seeking to promote industry-education integration, our results suggest that policy interventions should focus on creating enabling conditions for platform organizations rather than directly funding bilateral partnerships. Specific policy recommendations include: (1) establishing legal frameworks that recognize platform organizations as legitimate institutional forms for industry-education collaboration; (2) providing seed funding for platform infrastructure development, particularly knowledge co-creation spaces and digital interfaces; (3) creating incentive structures that reward platform-level outcomes rather than individual project outputs; and (4) developing regulatory frameworks for algorithmic governance that ensure transparency, fairness, and accountability.

For platform organizers, our findings provide a blueprint for platform design and governance. The strong mediating effect of boundary-spanning knowledge brokerage suggests that platforms should invest in dedicated boundary-spanning roles, knowledge mapping tools, and cross-sector interaction programs. The modular resource recombination finding indicates that platforms should design flexible resource allocation systems that enable rapid reconfiguration of knowledge assets, talent, and infrastructure. The governance configuration results suggest that platform organizers should adopt a portfolio approach to governance, combining contractual, relational, incentive-based, and algorithmic mechanisms in complementary ways, with particular attention to building relational foundations before introducing formal governance mechanisms.

For industry-education participants, our results highlight the importance of active engagement with platform mechanisms. University researchers should leverage platform boundary-spanning resources to connect their theoretical expertise with industrial problem contexts. Enterprise R&D personnel should actively participate in platform knowledge co-creation spaces and contribute practical knowledge to collaborative projects. Both groups should invest in building relational capital within the platform while also engaging with formal governance mechanisms to protect their interests.

5.3 Boundary Conditions and Contextual Factors

While our findings are robust across different platform types and industry sectors, several boundary conditions warrant discussion. First, our research context is China, where government policy plays a significant role in promoting industry-education integration. The applicability of our findings to other institutional contexts—particularly market-driven innovation systems—requires further investigation. Second, our sample includes platforms that have been operational for at least two years; very early-stage platforms may exhibit different dynamics not captured in our study. Third, our focus on knowledge co-creation outcomes may not fully capture other important platform outcomes such as talent development, regional economic impact, or social value creation.

6 CONCLUSION

6.1 Summary of Findings

This study set out to investigate how platform organizations can be constructed and governed to facilitate knowledge co-creation in industry-education integration contexts. Through a sequential mixed-methods design combining qualitative case studies, quantitative survey data from 486 participants across 38 platforms, and fsQCA governance analysis, we have generated several important findings.

First, platform organizations for industry-education integration comprise three core architectural components: knowledge co-creation spaces, multi-stakeholder interaction interfaces, and value co-creation mechanisms. These components collectively enable a shift from linear knowledge transfer to multi-directional knowledge co-creation.

Second, platform organizational characteristics positively influence knowledge co-creation outcomes through three mediating mechanisms: boundary-spanning knowledge brokerage (indirect effect = 0.161), modular resource recombination (indirect effect = 0.130), and algorithmic trust calibration (indirect effect = 0.090). These mechanisms collectively explain 67.9% of the total effect of platform characteristics on knowledge co-creation.

Third, effective platform governance requires complementary configurations of contractual, relational, incentive-based, and algorithmic mechanisms. Relational governance serves as a foundational condition across all high-performance configurations. The optimal governance configuration evolves with platform maturity: early-stage platforms benefit from incentive-relational combinations, while mature platforms require balanced hybrid governance including algorithmic mechanisms.

6.2 Limitations and Future Research Directions

Several limitations of this study suggest promising directions for future research.

First, our cross-sectional survey design limits causal inference. While our theoretical framework posits causal relationships from platform characteristics to knowledge co-creation outcomes, alternative causal directions are possible.

Future research should employ longitudinal designs to track platform development and knowledge co-creation dynamics over time.

Second, our measurement of knowledge co-creation outcomes relies on perceptual measures. While perceptual measures are appropriate for capturing participant assessments of co-creation quality, future research should develop objective measures of knowledge co-creation outputs, such as joint publications, co-patents, new product launches, or process innovations.

Third, our study focuses on Chinese platforms, which operate within a specific institutional environment characterized by strong government involvement in innovation policy. Future research should examine platform organizations for industry-education integration in different institutional contexts, including developed economies with market-driven innovation systems and developing economies with emerging innovation infrastructures.

Fourth, while we identified three mediating mechanisms, other mechanisms may also be important. Future research should explore additional mechanisms such as collective learning processes, serendipity generation, or identity formation in platform contexts.

Fifth, our governance analysis identified four configurations, but the specific mechanisms within each configuration may require further unpacking. Future research should examine how specific governance practices (e.g., specific types of contracts, particular incentive designs, concrete algorithmic features) contribute to platform effectiveness.

Sixth, the rapid advancement of artificial intelligence technologies raises important questions about the future of platform organizations for knowledge co-creation. Future research should investigate how AI-powered tools—including large language models, knowledge graphs, and intelligent matching algorithms—can enhance or transform the mediating mechanisms identified in this study.

6.3 Concluding Remarks

In an era where the boundaries between knowledge production and knowledge application are increasingly blurred, platform organizations for industry-education integration represent a promising institutional innovation for harnessing the collective intelligence of universities, enterprises, and other stakeholders. By providing structured spaces for knowledge co-creation, standardized interfaces for multi-stakeholder interaction, and governance mechanisms that balance openness with control, these platforms can unlock significant value that remains untapped in traditional partnership models.

Our research demonstrates that the effectiveness of platform organizations depends not on any single design feature or governance mechanism but on the coherent integration of architectural components, mediating mechanisms, and governance configurations. The platform organization is not merely a neutral infrastructure but an active institutional actor that shapes knowledge co-creation processes and outcomes.

As economies worldwide grapple with the challenges of innovation-driven development, the platform organization model offers a scalable, adaptable, and sustainable approach to industry-education integration. By embracing the principles of platform design and governance articulated in this study, policymakers, educators, and industry leaders can create the collaborative ecosystems necessary to address the complex challenges of the 21st century knowledge economy.

COMPETING INTERESTS

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