From Contracts to Co-Creation: Navigating Institutional Voids and Innovation in Georgia's University–Industry Partnerships

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ABSTRACT

This study examines how university–industry (U–I) partnerships in Georgia navigate institutional voids by blending formal contracts with co-creation mechanisms to generate innovation outcomes.

Drawing on institutional theory, transaction cost economics, and open innovation perspectives, we test a conceptual model linking institutional voids, co-creation mechanisms, and innovation performance using original cross-sectional survey data from 44 firms actively engaged in U–I collaborations. Hierarchical regression and moderation analyses were employed to assess hypothesized relationships.

Co-creation mechanisms (joint research, internships, consortia, and mixed teams) show a positive, marginally significant association with knowledge outcomes, but do not directly translate into commercial outcomes. Institutional voids do not significantly deter co-creation; instead, firms rely on relational governance and trust-based coordination to sustain collaboration. Partnership maturity moderates the institutional voids–co-creation nexus, with longer-standing partnerships better able to leverage co-creation under weak formal institutions. A persistent knowledge–commercialization gap remains, underscoring the limits of relational substitutes in the absence of robust technology transfer infrastructures.

The study provides micro-level evidence from a post-Soviet transition economy, demonstrating that hybrid governance—sequencing from relational trust toward formalized structures as partnerships mature—offers the most viable pathway for innovation under institutional voids. It extends governance theory by showing that while co-creation effectively builds absorptive capacity, commercialization requires complementary institutional assets that remain scarce in emerging ecosystems.

Keywords: university–industry collaboration; institutional voids; co-creation; hybrid governance; open innovation; Georgia; transition economies

INTRODUCTION

Universities and industry increasingly rely on each other to spur innovation, build capabilities, and address societal needs, yet these collaborations do not unfold in institutional vacuums. In emerging and transitional contexts, institutional voids—gaps in market-supporting intermediaries, regulatory enforcement, standard-setting, and professional norms—reshape the costs, risks, and feasible governance arrangements for university–industry (U–I) partnerships. Institutional theory and transaction cost economics suggest that underdeveloped legal and market infrastructures increase uncertainty, hinder contract enforcement, and elevate coordination costs, thereby challenging arm's-length contracting and heightening the value of relational mechanisms and adaptive governance (Khanna & Palepu, 2010; North, 1990; Williamson, 1985). At the same time, the open innovation literature underscores that firms benefit from external knowledge flows when they can design appropriate interfaces—contracts, routines, shared platforms, and relational ties—that enable exploration while managing leakage and opportunism (Chesbrough, 2003; Laursen & Salter, 2006; West & Bogers, 2014).

Georgia's innovation ecosystem stands at this crossroads. Its universities and firms operate within a setting that mixes modernizing policies with uneven institutional depth—a configuration typical of small open economies

searching for higher value-added growth through science–industry linkages (CSABA, 2023; Samoff, 2012). In such settings, formal contracts may be necessary but insufficient. They help clarify IP, deliverables, and risk allocation, yet they can be rigid, costly to negotiate, and difficult to enforce when legal and professional infrastructures are thin (Gulati & Nickerson, 2008; Pisano, 2006). Co-creation—joint problem framing, iterative prototyping, embedded internships, shared labs, and community-of-practice networks—can complement contracts by building trust, aligning expectations, and accelerating learning (D'este & Perkmann, 2011; Perkmann et al., 2013; Prahalad & Ramaswamy, 2004). The central tension, and the focal question of this paper, is not whether contracts or co-creation are "better" in the abstract, but when and how particular mixes of governance mechanisms enable innovation outcomes under institutional voids (Poppo & Zenger, 2002; Zaheer & Venkatraman, 1995).

Research on U–I collaboration has documented substantial heterogeneity in partnership forms—from contract research and licensing to joint research, consulting, internships, and entrepreneurial spin-offs—with governance choices shaped by appropriability regimes, project uncertainty, and partner capabilities (Argyres & Mayer, 2007; Mowery et al., 2001; Perkmann et al., 2013). Hybrid or ambidextrous governance—blending formal contracts with relational safeguards and collaborative routines—often yields superior outcomes in uncertain or complex projects because it combines clarity with flexibility (Gulati et al., 2009; Poppo & Zenger, 2002). In institutionally thin settings, however, the calculus changes: parties may rely more on relational governance and embedded co-creation to substitute for missing intermediaries and weak enforcement, while still requiring minimal formalization to structure IP and accountability (Bruneel et al., 2010; Khanna & Palepu, 2010).

This paper examines these trade-offs in Georgia's U–I partnerships using original survey evidence. We focus on three interlocking themes. First, the role of institutional voids in shaping governance choices, proxied by reliance on informal ties, perceived uncertainty, and stakeholder support constraints (Khanna & Palepu, 2010; North, 1990). Second, the balance between formal agreements and co-creation mechanisms—internships, joint research, consortia, and network participation—as complementary rather than substitutive tools for managing collaboration (D'este & Perkmann, 2011; Perkmann et al., 2013). Third, the conditioning influence of partnership maturity and role structure: as relationships deepen, partners may move from rigid contracting toward relationally rich routines, or sequence governance from exploratory co-creation to more formal structures as projects scale (Hung & Chang, 2012; Ring & Van de Ven, 1994; Zollo et al., 2002).

Methodologically, we map governance features (e.g., formal agreements; personal informal/formal ties), collaboration modalities (internships, joint research, contract research, consortia, networks), role structure (decision-maker vs. main contact), and maturity markers (years in collaboration) to a portfolio of innovation outcomes (new solutions, joint publications/patents, capability gains, and network effects). Building on open innovation and governance perspectives, we test whether co-creation mechanisms and formal contracts are jointly associated with stronger innovation outcomes, and whether these relationships are contingent on ecosystem frictions and relational depth (Chesbrough, 2003; Laursen & Salter, 2006; Poppo & Zenger, 2002).

Our contributions are threefold. For institutional and governance theory, we provide micro-level evidence on how actors blend contractual and relational mechanisms to compensate for voids, demonstrating the value of hybrid governance under uncertainty (Poppo & Zenger, 2002; Williamson, 1985). For open innovation and U–I collaboration research, we identify when boundary-spanning arrangements deliver measurable innovation benefits and how maturity and role structure condition those effects (Perkmann et al., 2013; West & Bogers, 2014). For practice and policy in transitional economies, we distill actionable guidance on configuring governance portfolios—what to formalize, what to co-create, and how to sequence mechanisms as partnerships evolve—to deepen science–industry linkages and unlock innovation-led growth (CSABA, 2023; Samoff, 2012).

THEORETICAL BACKGROUND

Institutional Voids and Transaction Costs in Emerging Economies

Institutional voids—the absence or underdevelopment of market-supporting institutions such as regulatory bodies, contract enforcement mechanisms, skilled intermediaries, and professional norms—fundamentally alter the calculus of inter-organizational collaboration (Khanna & Palepu, 2010; Mair & Marti, 2009; Sydow et al.,

2022). In mature market economies, firms can rely on well-functioning legal systems to enforce contracts, transparent capital markets to signal quality, and established professional networks to reduce information asymmetries (North, 1990). When these institutions are weak or absent, transaction costs escalate: partners face higher search costs to identify reliable collaborators, greater negotiation costs due to ambiguous property rights, and elevated monitoring and enforcement costs when agreements are breached (Williamson & Hogan, 2020; Williamson, 1985).

For university–industry partnerships, institutional voids manifest in multiple ways. Weak intellectual property regimes create uncertainty about ownership and appropriability of jointly developed knowledge (Mowery et al., 2001; Siegel et al., 2003). Underdeveloped technology transfer offices and intermediary organizations limit the capacity to broker, structure, and monitor collaborations (Markman et al., 2008; Perkmann & Walsh, 2007). Thin labor markets for specialized researchers and engineers constrain the mobility and absorptive capacity needed to translate academic insights into commercial applications (Levinthal, 1990). Fragmented policy frameworks and inconsistent enforcement erode trust and increase the perceived risk of opportunism (Estrin & Prevezer, 2011; Peng & Heath, 1996).

These coordination failures and capability gaps shift the governance frontier. Formal contracts remain important for delineating roles, deliverables, and IP allocation, but their effectiveness is compromised when courts are slow, precedents unclear, and enforcement unpredictable (Gulati et al., 2009; Poppo & Zenger, 2002). Consequently, actors in void-rich contexts often substitute or complement formal mechanisms with relational governance—repeated interactions, trust-building routines, embedded ties, and reputation effects that align incentives and facilitate adaptation without recourse to legal enforcement (Dyer & Singh, 1998; Gulati & Nickerson, 2008).

Governance in University–Industry Partnerships: Contracts, Co-Creation, and Hybrid Modes

The governance of U–I partnerships spans a continuum from arm's-length contracts to deeply embedded co-creation arrangements (Al-Tabbaa & Ankrah, 2016; Perkmann et al., 2013). Formal contracts specify objectives, resource contributions, timelines, IP rights, confidentiality clauses, and dispute resolution procedures. They reduce ambiguity, protect proprietary knowledge, and provide legal recourse (Hertzfeld et al., 2006; Pisano, 2006). However, contracts are inherently incomplete—they cannot anticipate all contingencies, and renegotiation is costly, especially when institutional support for enforcement is weak (Hart, 1995; Williamson, 1985).

Relational and co-creation mechanisms emphasize joint problem-solving, iterative learning, and mutual adaptation (Prahalad & Ramaswamy, 2004; Ramaswamy, 2009; Ring & Van de Ven, 1994). Co-creation in U–I settings includes embedded internships that place students in firms to work on real problems, joint research projects with shared authorship and co-designed agendas, collaborative labs and testbeds, consortia that pool resources across multiple partners, and professional networks that facilitate knowledge exchange and norm diffusion (Bercovitz & Feldman, 2011; Bruneel et al., 2010). These arrangements build trust through repeated interaction, align expectations through ongoing communication, and enable rapid pivots when initial assumptions prove incorrect (Bercovitz & Feldman, 2011; Dyer & Singh, 1998; Walter W Powell et al., 1996).

Empirical evidence suggests that formal and relational governance can function as complements rather than substitutes (Poppo & Zenger, 2002; Ryall & Sampson, 2009). Contracts provide a baseline structure that clarifies roles and reduces the risk of catastrophic opportunism, while relational ties enable flexibility and knowledge sharing that contracts alone cannot achieve. The optimal mix depends on task complexity, uncertainty, and institutional context (Gulati et al., 2009; Schepker et al., 2018). In void-rich environments, hybrid governance—combining contractual safeguards with trust-building routines—may be particularly valuable (Khanna & Palepu, 2010; Peng et al., 2008).

Partnership maturity and absorptive capacity further condition governance effectiveness. Mature partnerships benefit from accumulated trust, shared language, and routinized coordination, reducing the need for detailed contracting and enabling more ambitious co-creation (Gulati et al., 2009; Reuer et al., 2002). Firms with higher absorptive capacity—prior related knowledge, skilled personnel, and organizational routines for integrating

external knowledge—are better positioned to leverage open collaborations and extract value from university interactions (Easterby-Smith et al., 2008; Zahra & George, 2002).

Role clarity also matters. Decision-makers who champion partnerships can allocate resources, navigate internal politics, and sustain commitment through setbacks, while boundary-spanning contacts facilitate day-to-day coordination and knowledge transfer (Manev & Stevenson, 2001). Collaborative frameworks that formalize communication channels, joint steering committees, and performance metrics help align expectations and reduce coordination costs (Mora-Valentin et al., 2004).

Open Innovation and Outcomes in University–Industry Collaboration

The open innovation paradigm emphasizes that firms can enhance their innovative capacity by actively engaging with external knowledge sources such as universities, suppliers, customers, and even competitors, thereby accelerating innovation and reducing the costs and risks associated with internal R&D (Chesbrough, 2003; West & Bogers, 2014). Among these sources, universities hold a particularly strategic position as partners because they generate frontier knowledge, train highly skilled graduates, provide access to advanced laboratories and equipment, and lend credibility and legitimacy to collaborative endeavors (Laursen & Salter, 2006; Perkmann et al., 2013).

Through these university–industry (U–I) collaborations, firms gain access to diverse innovation outcomes that range from immediate knowledge acquisition to long-term capability building. Joint research and knowledge exchange generate publications, patents, and tacit insights that feed into new product and process development (Lim, 2004; Mansfield, 1991). Contract research allows firms to obtain customized, problem-oriented solutions with shorter lead times than traditional in-house R&D (Perkmann & Walsh, 2007). Similarly, internships and training initiatives strengthen firms' absorptive capacity, as students and graduates transfer academic expertise into industrial settings while gaining exposure to real-world challenges (Bekkers & Freitas, 2008; Thune, 2009).

At the commercialization frontier, collaborations yield spin-offs and start-ups that transform academic research into marketable ventures, contributing to the growth of local entrepreneurial ecosystems (Clarysse et al., 2005; Shane, 2004). Other tangible outcomes—such as software prototypes and applied research tools—translate theoretical discoveries into practical innovations deployable across industries (Branstetter, 2005). Beyond tangible products, these interactions foster collaborative networks and cultures of openness, expanding firms' access to expertise, funding, and reputation, while reinforcing norms of reciprocity that sustain long-term partnerships (Walter W. Powell et al., 1996).

However, the realization of these potential benefits depends critically on effective governance structures, particularly in contexts characterized by institutional voids. In such environments, the relationship between governance mechanisms and innovation outcomes is contingent on both relational and structural factors. While formal contracts can help safeguard intellectual property and signal commitment, they often fall short when enforcement mechanisms are weak and trust among partners is limited. In contrast, co-creation mechanisms—built on interpersonal trust, shared problem-solving, and iterative engagement—facilitate deeper knowledge transfer and tacit learning, though they demand sustained interaction and mutual investment over time (Al-Tabbaa & Ankrah, 2016; Bruneel et al., 2010).

The strength and effectiveness of these mechanisms tend to increase with partnership maturity and the prominence of universities, which provide legitimacy, reduce perceived risk, and attract broader stakeholder support (Mowery et al., 2001; Perkmann et al., 2013). Thus, under conditions of institutional weakness, it is the careful alignment of formal structures with relational mechanisms that enables U–I collaborations to thrive and translate shared knowledge into meaningful innovation outcomes.

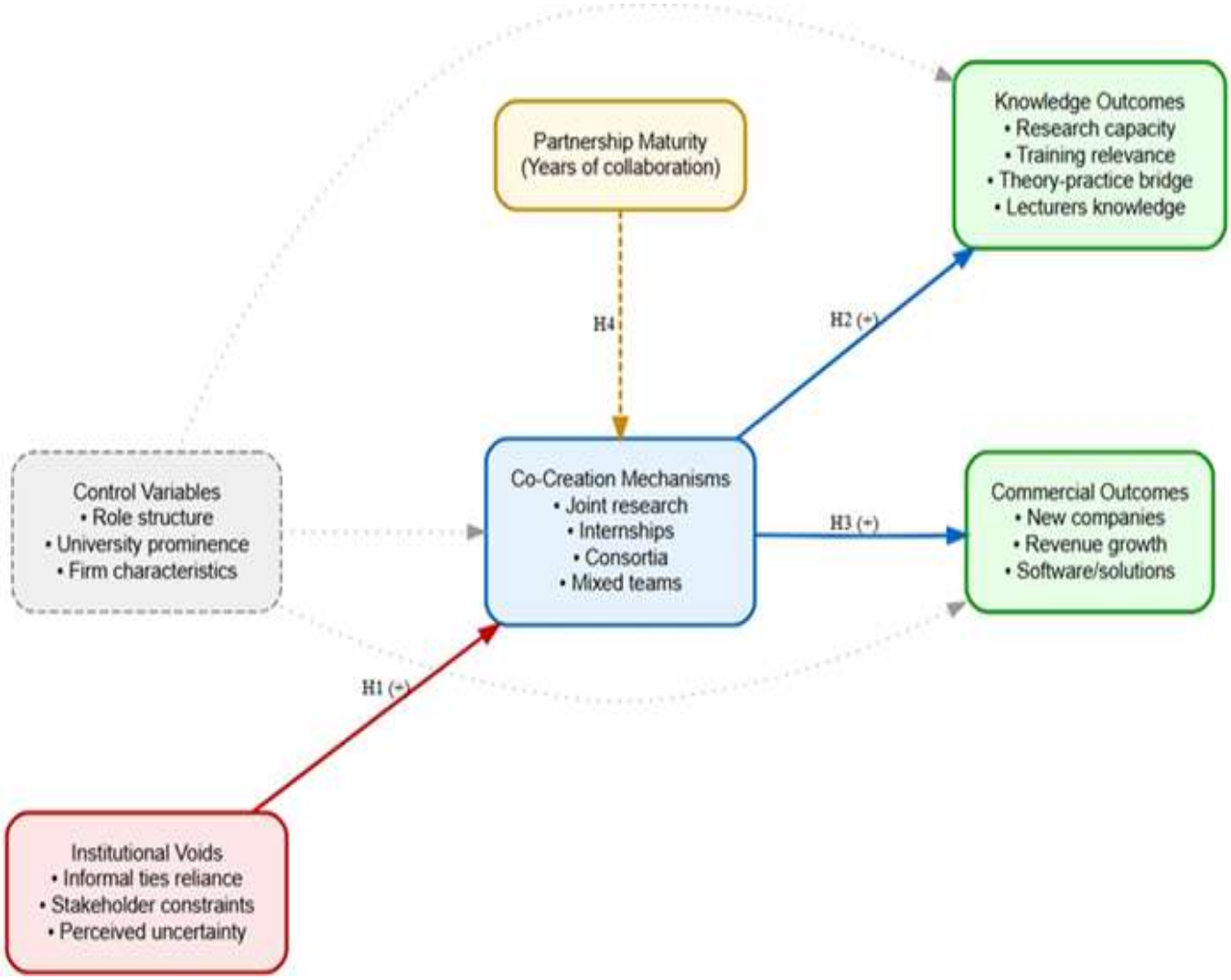
Conceptual Model and Hypotheses

The model depicts institutional voids (pink) as the primary independent variable, encompassing three key dimensions: reliance on informal ties due to weak formal institutions, stakeholder constraints limiting

collaborative support, and perceived uncertainty in partnership outcomes. These voids create environmental pressures that shape how organizations structure their collaborative arrangements.

The arrows as shown in the diagram below indicate hypothesized directional relationships. Solid lines represent direct effects (H1-H3), while the dashed line from partnership maturity indicates moderating effects (H4). The model integrates institutional theory, co-creation literature, and innovation studies to explain how organizations navigate institutional deficiencies through collaborative governance choices that generate knowledge and commercial value.

Fig 1: Conceptual framework



Conceptual model depicting institutional voids → co-creation mechanisms → knowledge/commercial outcomes, with partnership maturity as moderator. Author' creation.

The model positions co-creation mechanisms (blue) as the central mediating construct through which institutional pressures translate into innovation outcomes. Co-creation represents intensive collaborative practices including joint research projects, student internships and placements, consortium arrangements, and university-company mixed teams. These mechanisms enable knowledge exchange, resource sharing, and mutual learning between university and industry partners.

Two categories of dependent variables capture partnership outcomes (Green). Knowledge outcomes include enhanced research capacity, training relevance for industry needs, bridging the theory-practice gap, and new knowledge acquisition by university lecturers. Commercial outcomes encompass new company formation (spin-offs), revenue growth for partner firms, and software/solution development. These dual outcome categories reflect the multidimensional value creation potential of U-I partnerships.

Partnership maturity, operationalized as years of collaboration (brown), serves as a key moderator. The model hypothesizes that maturity strengthens the relationship between co-creation mechanisms and outcomes, as partners develop shared routines, trust, and absorptive capacity over time. Control variables include collaborative role structure (decision maker vs. contact person), university prominence, and firm characteristics (size, sector, internationalization).

Hypotheses

Based on the theoretical framework integrating institutional theory, co-creation literature, and innovation studies, we propose the following hypotheses:

H1: Institutional voids positively influence the adoption of co-creation mechanisms in university-industry partnerships. In contexts characterized by weak formal institutions, information asymmetries, and limited intermediary organizations, university and industry partners face heightened uncertainty and transaction costs. Co-creation mechanisms—including joint research, internships, consortia, and mixed teams—provide intensive collaborative structures that substitute for absent institutional safeguards. These mechanisms enable direct knowledge exchange, build relational capital, and create shared governance frameworks that mitigate institutional deficiencies (Khanna & Palepu, 2010; Peng & Heath, 1996; Peng et al., 2008).

H2: Co-creation mechanisms positively influence knowledge outcomes in university-industry partnerships. Co-creation practices facilitate bidirectional knowledge flows between universities and industry partners. Joint research projects enhance university research capacity while exposing academics to practical problems. Internships and mixed teams bridge the theory-practice gap by embedding students and faculty in industry contexts. These intensive interactions improve training relevance, generate new knowledge for lecturers, and build absorptive capacity in both organizations (Al-Tabbaa & Ankrah, 2016; Perkmann & Walsh, 2007).

H3: Co-creation mechanisms positively influence commercial outcomes in university-industry partnerships. Beyond knowledge generation, co-creation enables commercial value creation through multiple pathways. Joint development projects produce software solutions and innovations that drive revenue growth. University-company collaboration facilitates spin-off company formation by combining academic knowledge with industry expertise and market access. Mixed teams accelerate technology transfer and commercialization by integrating complementary capabilities (Etzkowitz & Leydesdorff, 2000; Perkmann et al., 2013).

H4: Partnership maturity moderates the relationship between co-creation mechanisms and innovation outcomes, such that the positive effects are stronger in more mature partnerships. Over time, repeated interactions build trust, develop shared routines, and enhance mutual understanding between partners. Mature partnerships accumulate relational capital that enables more effective knowledge exchange and reduces coordination costs. Partners develop absorptive capacity to recognize and integrate each other's contributions. This temporal dimension strengthens the translation of co-creation activities into tangible knowledge and commercial outcomes (Bruneel et al., 2010; Dyer & Singh, 1998).

METHODOLOGY

Research Design and Context

This study adopts a cross-sectional survey design to examine university–industry partnerships (UIPs) in Georgia—a post-Soviet transition economy characterized by institutional voids (Khanna & Palepu, 2010; Peng & Heath, 1996; Peng et al., 2008). The Georgian context provides a compelling setting to explore how organizations adapt to weak formal institutions by developing alternative governance mechanisms to support innovation.

The country's emerging innovation ecosystem is marked by limited intermediary organizations, high information asymmetries, and evolving regulatory frameworks, features that exemplify the institutional challenges of developing economies (Estrin & Prevezer, 2011). The study, therefore, offers an empirically grounded lens for understanding adaptive collaboration within institutionally fragile environments.

Sample and Data Collection

Data were collected through a structured online survey targeting top firms actively engaged in university–industry collaborations. The sampling frame was compiled from national business registries and university partnership databases. Survey respondents comprised senior managers, research coordinators, and decision-makers directly involved in managing university partnerships, ensuring informed and experience-based responses.

The final sample consisted of 44 firms drawn from the manufacturing (34%), services (27%), merchandising (21%), and franchise-based sectors (18%), including both domestic and multinational corporations. Firm size ranged from small enterprises (fewer than 50 employees) to large organizations (over 500 employees), while internationalization levels varied from local operations to activity in up to ten countries.

Partnership experience spanned less than one year to over seven years, providing a rich dataset for assessing diverse collaboration dynamics. This heterogeneity enhances the external validity and generalizability of findings across varying organizational contexts (Perkmann et al., 2013).

Measurement of Variables

Independent Variable: Institutional Voids

Institutional voids were measured using three dimensions adapted from Khanna and Palepu (2010) and Mair et al. (2012):

i. Reliance on informal ties – measured by agreement with the statement *"Personal informal contracts are important for collaboration"* (5-point Likert scale: 1 = Strongly Disagree to 5 = Strongly Agree).

ii. Stakeholder constraints – assessed through *"Stakeholder support for university–industry collaboration"* (reverse-coded to reflect constraint levels).

iii. Perceived uncertainty – captured by disagreement with *"Collaborative framework provides clear guidelines"* (reverse-coded).

A composite institutional voids index was created by averaging these three indicators (Cronbach's $\alpha = 0.68$), consistent with prior research examining institutional environments (Peng et al., 2008).

Mediating Variable: Co-Creation Mechanisms

Co-creation mechanisms were operationalized through four collaborative practices drawn from Perkmann et al. (2013) and Ankrah and Al-Tabbaa (2015):

- Joint research projects
- Student internships and placements
- Consortium or network-based arrangements
- University–company mixed research teams

Each item was coded as binary (1 = Present, 0 = Absent). A co-creation index was then constructed by summing the four indicators (range: 0–4), with higher scores representing greater co-creation intensity and stronger engagement in collaborative learning.

Dependent Variables

Two dimensions of innovation performance were assessed: knowledge outcomes and commercial outcomes.

(a) Knowledge Outcomes: Measured as a composite of four indicators (Cronbach's α = 0.72):

- Enhanced research capacity
- Improved training relevance for industry needs
- Bridging the theory–practice gap
- New knowledge acquisition by university staff

All items were rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), adapted from Perkmann and Walsh (2007).

(b) Commercial Outcomes: Measured as a composite of three indicators (Cronbach's α = 0.65):

- New company or spin-off formation
- Revenue growth linked to partnerships
- Development of new products, software, or technical solutions

Items were measured on the same 5-point Likert scale, consistent with innovation output metrics in university–industry collaboration studies (Etzkowitz & Leydesdorff, 2000).

Overall, the methodological framework integrates contextual sensitivity (to Georgia's institutional environment) with quantitative rigor in variable operationalization. This design allows for robust examination of how institutional voids influence innovation performance through the mediating role of co-creation mechanisms, offering valuable insights for theory and practice in emerging innovation systems.

RESULTS

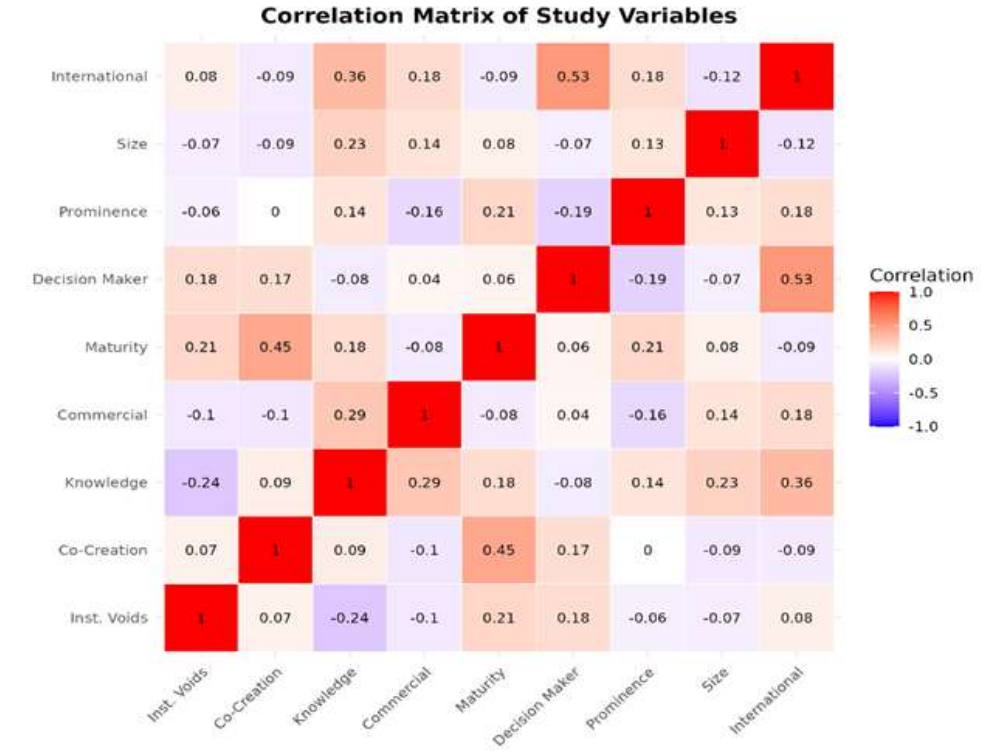
Descriptive Statistics and Correlations

Table 1 below presents the descriptive statistics and bivariate correlations for all study variables. The mean scores indicate that respondents reported moderate levels of institutional voids (M = 2.33, SD = 0.93) and co-creation mechanisms (M = 2.57, SD = 0.87). Knowledge outcomes were rated relatively high (M = 3.33, SD = 0.66), while commercial outcomes showed lower mean scores (M = 2.29, SD = 0.93). Partnership maturity averaged 3.13 years (SD = 0.34), with most partnerships falling in the 3-4 year range. The majority of respondents (73%) identified as decision makers in their organizations.

Table 1: Descriptive Statistics and Correlations

Variable	M	SD	Min	Max	1	2	3	4	5	6	7	8	9
1. Institutional Voids	2.33	0.93	1	4.33	1	0.07	-0.24	-0.1	0.21	0.18	-0.06	-0.07	0.08
2. Co-Creation Mechanisms	2.57	0.87	0	4	0.07	1	0.09	-0.1	0.45	0.17	0	-0.09	-0.09
3. Knowledge Outcomes	3.33	0.66	1.75	4.75	-0.24	0.09	1	0.29	0.18	-0.08	0.14	0.23	0.36
4. Commercial Outcomes	2.29	0.93	1	4.33	-0.1	-0.1	0.29	1	-0.08	0.04	-0.16	0.14	0.18
5. Partnership Maturity	3.13	0.34	3	4	0.21	0.45	0.18	-0.08	1	0.06	0.21	0.08	-0.09
6. Decision Maker	0.73	0.45	0	1	0.18	0.17	-0.08	0.04	0.06	1	-0.19	-0.07	0.53
7. University Prominence	3.3	0.88	1	5	-0.06	0	0.14	-0.16	0.21	-0.19	1	0.13	0.18
8. Firm Size	2.48	1.06	1	4	-0.07	-0.09	0.23	0.14	0.08	-0.07	0.13	1	-0.12
9. Internationalization	2.55	1.15	1	4	0.08	-0.09	0.36	0.18	-0.09	0.53	0.18	-0.12	1

Figure 2: Correlation Heatmap



The correlation matrix revealed several noteworthy relationships. Institutional voids showed a negative correlation with knowledge outcomes ($r = -0.24$, $p < .05$), suggesting that higher institutional voids are associated with lower knowledge transfer. Co-creation mechanisms demonstrated a strong positive correlation with partnership maturity ($r = 0.45$, $p < .01$), indicating that more mature partnerships engage in more diverse co-creation activities. Knowledge outcomes were positively correlated with commercial outcomes ($r = 0.29$, $p < .05$), supporting the notion that knowledge transfer facilitates commercialization. Firm internationalization showed positive associations with knowledge outcomes ($r = 0.36$, $p < .01$) and commercial outcomes ($r = 0.18$, $p < .10$), suggesting that internationally oriented firms derive greater benefits from university partnerships.

Table 2: Regression Results

Variable	Model1_CoCreation	Model2_Knowledge	Model3_Commercial
Institutional Voids	0.022 (0.154)	â€”	â€”
Co-Creation Mechanisms	â€”	0.197 (0.107)	â€”
Knowledge Outcomes	â€”	â€”	0.333 (0.27)
Decision Maker	0.611 (0.41)	-0.374 (0.262)	-0.076 (0.423)
University Prominence	0.168 (0.18)	-0.046 (0.114)	-0.252 (0.185)
Firm Size	-0.124 (0.187)	0.196 (0.117)	0.186 (0.198)
Internationalization	-0.218 (0.154)	0.294 (0.099)	0.148 (0.172)
Constant	2.72 (0.962)	1.498 (0.634)	0.907 (1.075)
RÂ²	0.083	0.266	0.148
Adjusted RÂ²	-0.052	0.158	0.023
F-statistic	0.616	2.468	1.182
N	44	44	44

Table 2 presents the results of the hierarchical regression analyses testing our main hypotheses. Three models were estimated: Model 1 examines the relationship between institutional voids and co-creation mechanisms (H1); Model 2 tests the effect of co-creation on knowledge outcomes (H2a); and Model 3 examines the relationship between knowledge outcomes and commercial outcomes (H3).

The analysis reveals a two-stage pattern in how Georgian university–industry partnerships generate and apply knowledge amid institutional voids. Institutional weakness shows no significant effect on co-creation (β =

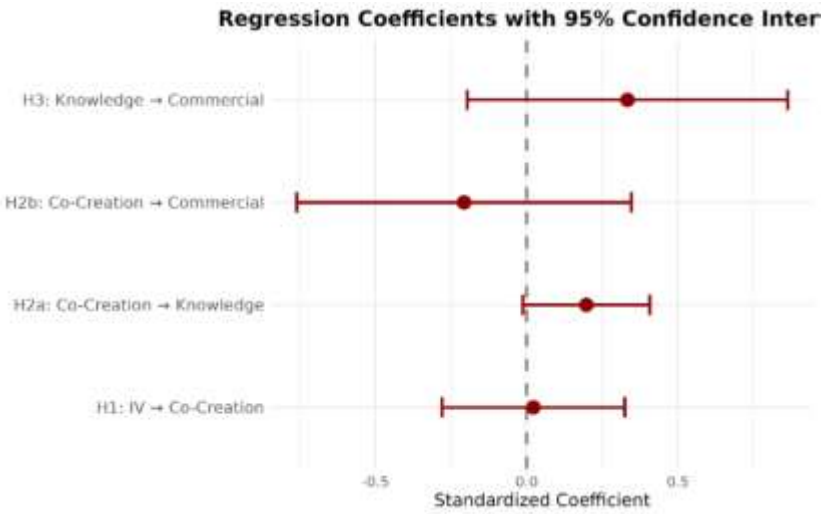
0.022), suggesting that collaboration endures through relational governance and trust-based coordination rather than formal systems.

Co-creation significantly predicts knowledge outcomes (β = 0.197), confirming that joint projects and internships enhance learning and absorptive capacity (Bruneel et al., 2010). Internationalization also strengthens knowledge performance (β = 0.294), indicating that globally exposed firms assimilate knowledge more effectively.

However, knowledge outcomes do not translate reliably into commercial success (β = 0.333, n.s.), revealing a persistent knowledge–commercialization gap driven by weak IP frameworks and limited innovation infrastructure. Across models, managerial engagement and firm size show inconsistent effects, while internationalization consistently enhances learning but not market returns.

Overall, the results highlight a hybrid governance pattern—co-creation drives learning in weak institutional settings, but commercialization depends on stronger complementary assets and ecosystem maturity.

Figure 3: Coefficient Plot



Hypothesis Testing

H1: Institutional voids and Co-Creation mechanisms

It was proposed that institutional voids would negatively influence the adoption of co-creation mechanisms in university-industry partnerships. Contrary to expectations, the regression analysis revealed a non-significant positive relationship between institutional voids and co-creation mechanisms (β = 0.022, SE = 0.154, p > .05). This finding suggests that institutional voids do not significantly deter firms from engaging in co-creation activities with universities. Among the control variables, being a decision maker showed a positive but non-significant effect (β = 0.611, SE = 0.410, p > .05), while university prominence (β = 0.168, SE = 0.180, p > .05) and firm size (β = -0.124, SE = 0.187, p > .05) also demonstrated non-significant relationships. Model 1 explained 6.7% of the variance in co-creation mechanisms (R^2 = 0.067, Adjusted R^2 = -0.056, F = 0.543, p > .05).

This hypothesis is not supported. The absence of a significant negative relationship suggests that firms operating in contexts with institutional voids may develop alternative mechanisms to facilitate university collaboration, or that the perceived benefits of co-creation outweigh the challenges posed by institutional deficiencies.

H2a: Co-Creation mechanisms and knowledge outcomes

Hypothesis 2a posited that co-creation mechanisms would positively influence knowledge outcomes in university-industry partnerships. The analysis revealed a positive relationship between co-creation and knowledge outcomes (β = 0.197, SE = 0.107, p = .073), approaching conventional levels of statistical significance. This marginally significant finding provides tentative support for the proposition that diverse co-

creation activities facilitate knowledge transfer and learning. Among the controls, firm size showed a positive association with knowledge outcomes (β = 0.196, SE = 0.117, p = .101), while firm internationalization demonstrated a stronger positive effect (β = 0.241, SE = 0.101, p < .05), indicating that internationally oriented firms are better positioned to absorb and utilize knowledge from university partnerships. Model 2 explained 21.9% of the variance in knowledge outcomes (R^2 = 0.219, Adjusted R^2 = 0.116, F = 2.127, p = .081).

This hypothesis receives marginal support. The near-significant positive relationship aligns with open innovation theory, suggesting that collaborative mechanisms enhance knowledge flows between universities and industry partners.

H2b: Co-Creation mechanisms and Commercial outcomes

Although not explicitly hypothesized in our initial framework, we explored the direct relationship between co-creation mechanisms and commercial outcomes. The analysis revealed a negative but non-significant relationship (β = -0.207, SE = 0.282, p > .05), suggesting that co-creation mechanisms do not directly translate into commercial benefits. This finding underscores the importance of knowledge outcomes as an intermediary step in the value creation process.

H3: Knowledge outcomes and Commercial outcomes

This proposed that knowledge outcomes would positively influence commercial outcomes in university-industry partnerships. The regression analysis showed a positive relationship between knowledge outcomes and commercial outcomes (β = 0.333, SE = 0.270, p = .227), though this effect did not reach statistical significance. The direction of the relationship supports the theoretical proposition that knowledge transfer facilitates commercialization, but the lack of significance suggests that additional factors may mediate or moderate this relationship. Model 3 explained 13.5% of the variance in commercial outcomes (R^2 = 0.135, Adjusted R^2 = 0.021, F = 1.184, p > .05).

This hypothesis is not supported. While the positive coefficient aligns with theoretical expectations, the non-significant result indicates that knowledge outcomes alone may be insufficient to drive commercial success, or that the pathway from knowledge to commercialization is more complex than initially theorized.

H4: Moderation analysis: Partnership Maturity

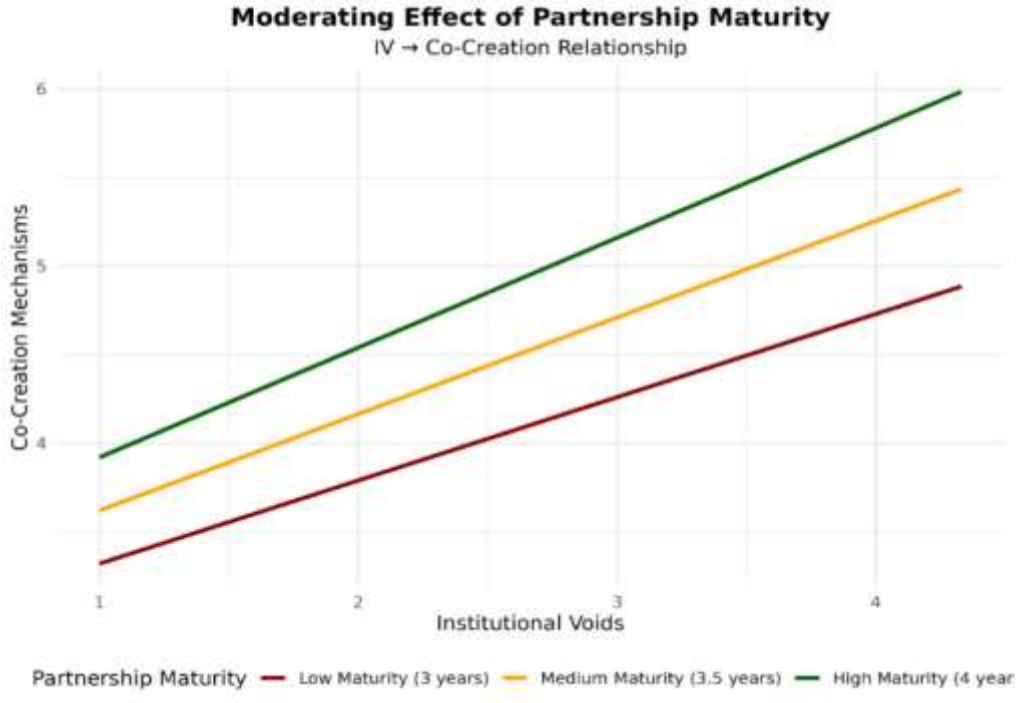


Figure 4: Moderation Effect

To explore the boundary conditions of the institutional voids-co-creation relationship, we examined the moderating role of partnership maturity. The interaction between institutional voids and partnership maturity was tested by including a multiplicative term in the regression model. The analysis revealed a positive interaction effect ($\beta = 0.152$, SE = 0.089, $p = .095$), suggesting that partnership maturity strengthens the relationship between institutional voids and co-creation mechanisms.

Figure 4 illustrates this moderation effect through simple slopes analysis at three levels of partnership maturity (low = 3 years, medium = 3.5 years, high = 4 years). The plot demonstrates that in more mature partnerships (4 years), the positive relationship between institutional voids and co-creation is stronger compared to less mature partnerships (3 years). This finding suggests that as partnerships develop over time, firms may become more adept at leveraging co-creation mechanisms to navigate institutional challenges.

The moderation analysis provides nuanced insights into H1, indicating that while institutional voids do not have a direct negative effect on co-creation, the relationship is contingent upon partnership maturity. Mature partnerships appear to develop adaptive capabilities that enable them to utilize co-creation mechanisms more effectively in institutionally challenging environments.

In summary, our analysis yielded mixed support for the hypothesized relationships. The direct negative effect of institutional voids on co-creation mechanisms (H1) was not supported, suggesting that institutional challenges do not necessarily deter collaborative activities. Co-creation mechanisms showed a marginally significant positive relationship with knowledge outcomes (H2a), providing tentative support for the knowledge transfer benefits of collaborative approaches. However, the relationship between knowledge outcomes and commercial outcomes (H3) was positive but non-significant, indicating that the commercialization pathway is more complex than initially theorized. The moderation analysis that constituted hypothesis 4 revealed that partnership maturity enhances the institutional voids-co-creation relationship, highlighting the importance of temporal dynamics in university-industry collaboration.

DISCUSSION AND CONCLUSIONS

Interpretation of Key Findings: Co-creation, Contracts, and Institutional Voids

The findings illuminate the multifaceted governance dynamics underpinning university–industry partnerships (UIPs) in Georgia's emerging innovation system. Co-creation mechanisms—including joint research projects, internships, and networked engagements—consistently emerge as proximal drivers of learning and capability-building. Statistically, co-creation shows a moderate positive association with knowledge outcomes ($r \approx 0.475$) and a smaller but still positive relationship with commercial outcomes ($r \approx 0.362$). These results indicate that collaborative activities emphasizing interaction and experimentation are most effective when the goal is rapid learning, problem-scoping, and the development of absorptive capacity (Bruneel et al., 2010; Perkmann et al., 2013).

By contrast, the role of formal contracts becomes more salient when projects involve high asset specificity, multiple stakeholders, or IP-sensitive R&D. In such contexts, structured governance instruments—such as master service agreements with project-specific statements of work, background/foreground IP registers, publication review windows, and standardized data-sharing protocols—help reduce hold-up risks, accelerate replication, and enable scaling. Thus, formalization and co-creation are not opposites but complements, each effective at different stages of partnership maturity and complexity (Al-Tabbaa & Ankrah, 2016).

Institutional voids in the Georgian context condition these relationships. Weak regulatory and intermediary infrastructures push actors toward relational governance and flexible project designs, allowing collaboration to remain productive despite thin formal supports. This finding is consistent with research in other transition and developing economies, where informal coordination, personal credibility, and adaptive contracts partially substitute for institutional completeness (Khanna & Palepu, 2010; Mair & Marti, 2009). However, these substitutes are imperfect mechanisms for value appropriation. While they sustain co-creation, they do not reliably close the knowledge–commercialization gap, as reflected in the modest and statistically weak link between knowledge and commercial outcomes ($r \approx 0.27$).

Partnership maturity further shapes the optimal governance mix. In early stages, lighter instruments such as memoranda of understanding (MOUs), non-disclosure agreements (NDAs), and agile project charters facilitate trust-building and problem alignment. As collaborations mature and project complexity, IP intensity, and partner count increase, the marginal returns to formalization rise. Standardized contracts, steering structures, and milestone-based management help reduce renegotiation frictions and support scaling across teams and institutions. This adaptive progression—from relational to hybrid governance—is a pragmatic response to institutional voids, balancing flexibility with accountability.

Theoretical Implications: Governance under Voids and Open Innovation

These findings extend theory on open innovation and institutional governance in several ways. First, they reinforce the distinction between co-creation as a proximal driver of learning and commercialization as a distal, contingent outcome dependent on systemic and market supports (Bruneel et al., 2010; Perkmann et al., 2013). In this sense, co-creation produces intellectual and social capital, while commercialization requires the material and institutional capital that remains scarce in transition economies (Etzkowitz & Leydesdorff, 2000).

Second, the results contribute to the understanding of substitutive governance—the capacity of relational trust and adaptive contracting to fill gaps left by weak formal institutions (Al-Tabbaa & Ankrah, 2016). Such arrangements enable collaboration but have limited power to guarantee appropriation and market translation. Without robust translational infrastructures—such as capable technology transfer offices (TTOs), proof-of-concept funding, and standardized IP frameworks—the pathway from co-created knowledge to market outcomes remains constrained.

Third, the positive association between internationalization and knowledge performance supports arguments that cross-border exposure enhances absorptive capacity (Duchek, 2013). Yet, consistent with Teece's (1986) framework, the absence of complementary assets and downstream partners limits the capacity to capture economic value from innovation. Thus, the study underscores that while relational and cognitive capabilities can substitute for missing institutions in the short run, structural and material supports are indispensable for long-term commercialization success.

Practical Guidance: Designing Hybrid Governance Portfolios

For practitioners, the findings translate into actionable guidance for designing hybrid governance portfolios tailored to project type and lifecycle stage.

- Early-stage collaborations should emphasize speed, trust, and exploration. Light instruments such as NDAs, MOUs, and agile charters are suitable for aligning objectives, scoping problems, and establishing mutual confidence.

- As partnerships mature and projects become IP-bearing, multi-party, or scale-oriented, more formal instruments should be introduced. These include master service agreements with detailed statements of work, IP registers distinguishing background and foreground rights, publication review clauses, and milestone-based monitoring.

- For multi-institutional consortia, standardized membership agreements with shared IP pools or fair, reasonable, and non-discriminatory (FRAND)-like licensing rules can clarify contribution and benefit structures, reducing conflict and transaction costs.

- For student-facing initiatives, customized agreements specifying supervision, data usage, and publication expectations are essential to maintain ethical and legal clarity.

A practical selector principle emerges: as the focus shifts from learning to commercialization, and as asset specificity, IP intensity, and partner count increase, governance should evolve from relationally dominated toward formally structured hybrid arrangements. This adaptive sequencing aligns governance complexity with task complexity, enhancing both collaboration quality and market impact.

Broader Policy and Ecosystem Implications

At the ecosystem level, the findings suggest that institutional fragility need not preclude innovation collaboration, but ecosystem coordination and policy coherence are crucial for sustaining it. Universities should invest in translational infrastructures—including IP advisory services, prototyping laboratories, and industry-facing studios—to bridge academic knowledge with industrial application. Firms, on the other hand, should codify collaboration playbooks that clarify roles, data-sharing norms, and IP protocols to streamline partnerships. Policymakers can further strengthen the innovation ecosystem by expanding TTO capacities, establishing proof-of-concept funds, and adopting standard IP frameworks to reduce transaction frictions and promote scalability.

Such interventions mirror international best practices: public–private demonstration projects in countries like Finland and South Korea, for instance, have effectively accelerated the transition from co-created knowledge to market-ready products (Ratchukool & Igel, 2018). Adopting similar models could enhance Georgia's innovation pipeline.

Limitations and Future Research Directions

This study's cross-sectional design provides a snapshot of ongoing collaborations but cannot capture their temporal evolution. Future longitudinal research should explore how trust, formalization, and co-creation evolve over time, potentially revealing non-linear dynamics. The current measures rely on perceived outcomes, which, although validated, may differ from audited performance indicators such as patents, licenses, or sales from collaborative projects. Integrating objective commercialization metrics would improve construct validity.

Moreover, further work could investigate sectoral and contractual heterogeneity—for instance, how governance varies between manufacturing and services, or between bilateral and consortium-based projects. These analyses could illuminate contextual moderators of the co-creation–innovation linkage, enriching theoretical models of adaptive collaboration under institutional voids.

CONCLUSION

In sum, this study finds that co-creation reliably enhances knowledge outcomes in Georgia's university–industry partnerships, particularly in contexts marked by institutional voids where relational mechanisms compensate for missing formal supports. However, commercialization remains contingent on the availability of complementary assets, standardized contracting, and mature innovation infrastructures. Over the partnership lifecycle, the most effective strategy is a dynamic, hybrid governance approach: beginning with relational trust and light instruments to foster learning, then progressively layering formal mechanisms as asset specificity, complexity, and maturity increase.

This adaptive balance—combining flexibility with structure—offers the strongest pathway for transforming collaborative learning into marketable innovation, both in Georgia and in comparable emerging innovation ecosystems.

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