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Hybrid Governance for Innovation Impact: India's Institution's Innovation Council (IIC) and Global Partnerships

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Abstract - Institution's Innovation Council (IIC), launched by AICTE, have become a cornerstone of India's higher education innovation ecosystem. This study critically examines the IIC's evolving role in embedding innovation culture and positioning Indian Higher Education Institutions (HEIs) within global knowledge networks. By benchmarking against EU and US innovation hubs, the paper highlights governance, funding, and evaluation gaps while introducing the IIC Global Innovation Integration Model (IICGIIM). Using hierarchical linear modeling (N=120 HEIs, 12 regions), the study demonstrates that institutional innovation outputs (patents, startups) significantly predict globalization outcomes, while regional contexts (funding, policy strength, ecosystem maturity) moderate these effects.

Findings reveal that patents (β=0.55, $p<0.001$) and startups (β=0.38, $p<0.05$) outperform activity counts in driving internationalization, underscoring the need to recalibrate IIC evaluation toward impact-based metrics. Policy recommendations include adopting hybrid governance, diversifying funding streams, strengthening global partnerships, and embedding SDG alignment. While limited by its cross-sectional design and reliance on AICTE dashboards, the study establishes a baseline for longitudinal and crossnational extensions. By integrating innovation diffusion, institutional, and globalization theories, the IICGIIM framework advances comparative innovation governance literature and offers actionable pathways for India's HEIs to achieve global competitiveness though hybrid governance.

2. Introduction

2.1 Globalization has transformed higher education into a competitive, interconnected ecosystem. Innovation councils and hubs worldwide serve as catalysts for entrepreneurship, research, and sustainable development. India's IIC initiative, though relatively young, is emerging as a strategic instrument for embedding innovation culture in HEIs and aligning them with global standards.

2.2 India's IIC Model

- Established under AICTE to foster innovation and entrepreneurship.
- Functions through activity-based metrics (hackathons, workshops, startup incubation).
- Encourages student-centric innovation culture and institutional participation.
- Acts as a national framework for innovation governance in HEIs.

2.3 Global Comparisons

Dimension	India IIC	EU/US Hubs	Benchmarking Insight
Governance	Centralized under AICTE	Decentralized, multi-stakeholder	India can adopt hybrid governance
Funding	Institutional budgets, limited grants	Horizon Europe, NSF, venture capital	Diversify funding streams
Metrics	Activity-based	Impact-based (patents, startups, societal outcomes)	Shift to impact-driven evaluation
Global Linkages	Emerging collaborations	Strong international networks	Strengthen partnerships

2.4 Emerging Role of IIC in Globalization

- Innovation Culture Building – Embedding design thinking and entrepreneurship pedagogy.
- International Collaboration – Facilitating MoUs, joint projects, and student exchanges.
- Digital Integration – Dashboards and AI-driven analytics for global comparability.
- Policy Experimentation – Piloting innovation-linked funding aligned with UNESCO and OECD frameworks.

3. Literature Review

The Institution's Innovation Council (IIC) initiative can be situated within the broader scholarship on innovation ecosystems, higher education globalization, and comparative policy studies. This section synthesizes existing research while highlighting the contributions of Rupesh Londhe and other scholars to contextualize the IIC's emerging role.

3.1 Innovation Councils in Higher Education

Innovation councils worldwide are recognized as catalysts for embedding entrepreneurial culture, fostering design thinking, and strengthening academia–industry linkages. The European Institute of Innovation & Technology (EIT) and US NSF-funded innovation hubs emphasize decentralized governance and multi-stakeholder participation, contrasting with India's more centralized IIC structure under AICTE.

- Londhe's research on innovation ecosystems in Indian HEIs demonstrates how activity-based models—hackathons, workshops, and incubation programs—stimulate student innovation. His findings caution that centralized governance limits global competitiveness, underscoring the need for hybrid governance models.
- His work on design thinking pedagogy highlights experiential learning as a driver of entrepreneurial resilience, aligning with global calls for action-based innovation education.
- Complementary studies in stewardship management and organizational innovation (Londhe, 2023; 2026) emphasize ethical leadership and legitimacy as critical for sustaining innovation ecosystems.

3.2 Globalization of HEIs

Globalization reshapes Higher Education Institutions (HEIs) into interconnected knowledge networks, requiring innovation councils to act as bridges between local institutions and global ecosystems. Altbach and Knight argue that international collaborations, student mobility, and global rankings are central to this transformation.

- Londhe's comparative studies on UK and US innovation hubs show how global benchmarking can inform Indian HEIs in aligning innovation activities with international standards of impact measurement.
- His work on operationalizing innovation in Indian HEIs (2026) provides a methodological foundation for linking institutional innovation outputs (patents, startups) to globalization outcomes, directly informing the IICGIIM framework.
- Chaudhary & Goyal (2022) reinforce this by arguing that experiential pedagogy is essential for cultivating entrepreneurial resilience, complementing Londhe's emphasis on action-driven innovation ecosystems.
- Knight (2015) and Altbach (2007) highlight the tension between local legitimacy and global competitiveness, a challenge directly addressed by the IIC framework.

3.3 Comparative Innovation Hubs

Comparative studies of innovation hubs in Europe, the US, and Asia reveal differences in funding models, inclusivity, and impact metrics. EU hubs rely on large-scale public funding (Horizon Europe), while US hubs integrate venture capital and university–industry partnerships. India's IIC, by contrast, remains largely activity-driven, with limited mechanisms for global benchmarking.

- Londhe's research on comparative innovation governance emphasizes the need for impact-based evaluation—patents, startups, and societal outcomes—rather than activity counts alone.
- His contributions highlight the importance of digital integration (AI-driven dashboards, real-time benchmarking) as a pathway for Indian HEIs to embed themselves into global innovation ecosystems.
- OECD (2022) and UNESCO (2021) situate innovation councils within the broader framework of sustainable development goals (SDGs), underscoring legitimacy through alignment with global norms.
- Comparative Asian studies, such as Singapore's ASTAR and South Korea's innovation clusters, demonstrate how hybrid governance and strong industry linkages accelerate global competitiveness, offering lessons for India's IIC.

3.4 Hybrid Governance in Innovation and Higher Education

Hybrid governance has emerged as a critical framework for managing innovation ecosystems and higher education institutions, particularly where centralized authority must coexist with decentralized stakeholder participation. It blends state regulation, market mechanisms, institutional autonomy, and civil society engagement into multi-actor arrangements that enhance legitimacy, inclusivity, and responsiveness.

- Multi-actor governance: Leišytė (2025) conceptualizes hybrid governance in higher education as a multi-level system where governments, universities, industries, and external stakeholders jointly steer innovation. This balances accountability with flexibility, ensuring competitiveness while maintaining local legitimacy.

· Innovation ecosystems: Comparative studies of EU's EIT hubs and US NSF-funded innovation councils show that hybrid governance accelerates innovation diffusion by integrating public funding, private venture capital, and industry partnerships. This contrasts with India's centralized IIC model, which risks limiting global competitiveness unless hybrid structures are adopted.

· Legitimacy and inclusivity: Stoker (2019) and OECD (2022) highlight that hybrid governance enhances legitimacy by embedding diverse voices—universities, regional councils, industry, and civil society—into decision-making. This inclusivity strengthens innovation ecosystems and aligns them with SDG frameworks.

· Asian innovation clusters: Singapore's ASTAR and South Korea's innovation clusters exemplify hybrid governance in practice. Their success lies in combining strong state support with industry linkages and university autonomy, offering lessons for India's IIC in balancing centralized oversight with decentralized participation.

3.5 Identified Gaps

· While scholarship on innovation ecosystems and higher education globalization is extensive, there remains limited comparative analysis of India's IIC vis-à-vis EU and US innovation hubs.

· Hybrid governance is well-theorized globally, but its application to India's IIC remains underexplored. Existing literature emphasizes either centralized governance (AICTE-led) or decentralized hubs (EU/US), but few studies analyze how hybrid governance could operationalize the IICGIIM framework to embed Indian HEIs into global networks.

3.6 Contributions

1. Conceptual Contribution – The paper introduces the IICGIIM framework, integrating Innovation Diffusion Theory, Institutional Theory, and Globalization Theory. This advances conceptual understanding by showing how institutional innovation activities, regional governance contexts, and global benchmarking jointly shape globalization outcomes in Indian HEIs.
2. Empirical Contribution – Through Hierarchical Linear Modeling across 120 HEIs and 12 regions, the study provides statistical rigor with effect sizes, confidence intervals, and cross-level interactions. Findings demonstrate that patents ($\beta=0.55$, $p<0.001$) and startups ($\beta=0.38$, $p<0.05$) are stronger predictors of globalization outcomes than activity counts, reframing IIC evaluation from activity-based to impact-driven metrics.
3. Policy Contribution – The paper offers actionable insights for AICTE and HEIs: transition toward hybrid governance, diversify funding streams, strengthen global partnerships, and embed SDG alignment (SDG 4 and SDG 9). These recommendations position India's IIC as a globally competitive innovation council and establish a baseline for future longitudinal and cross-national studies.

3.7 Remaining Gaps

· Longitudinal Evidence – Current analyses rely on cross-sectional data; longitudinal research is needed to capture the dynamic evolution of innovation councils and their sustained impact.

· Cross-National Comparisons – Comparative studies remain concentrated on EU and US hubs; expanding to Asia, Africa, and Latin America would provide richer insights into regional variations and convergence trends.

· Community-Centric Metrics – Existing frameworks privilege patents, startups, and rankings, while underrepresenting societal outcomes such as social entrepreneurship, community engagement, and sustainability indicators.

· Digital Governance Frameworks – Current models lack robust mechanisms for transparency and comparability; integrating AI-driven dashboards, predictive analytics, and blockchain governance could enhance accountability and global benchmarking.

4. Theoretical Framework

This study is anchored in four complementary theoretical perspectives that collectively explain the Institution's Innovation Council (IIC)'s role in embedding innovation culture and enabling global linkages.

4.1 Innovation Diffusion Theory (Rogers, 2003)

· Explains how innovations spread within social systems.

· Applied here, IIC acts as a diffusion mechanism, embedding innovation culture across Indian HEIs through hackathons, startup incubation, and design thinking workshops.

· Demonstrates how activity-based initiatives diffuse entrepreneurial practices among students and faculty.

4.2 Institutional Theory

- Focuses on governance structures, legitimacy, and organizational conformity.
- India's IIC reflects a centralized institutional design under AICTE, while EU/US hubs embody decentralized, multi-stakeholder governance.
- This framework helps analyze how governance models influence innovation outcomes and global competitiveness.

4.3 Globalization Theory

- Highlights cross-border knowledge flows, international collaborations, and global benchmarking.
- IIC's emerging role in facilitating MoUs, joint projects, and digital dashboards aligns with globalization theory, positioning Indian HEIs within international knowledge networks.
- Explains how innovation councils act as connectors between local ecosystems and global innovation networks.

4.4 Hybrid Governance Theory

- Hybrid governance blends state regulation, market mechanisms, institutional autonomy, and civil society engagement into multi-actor arrangements.
- In innovation ecosystems, hybrid governance ensures legitimacy, inclusivity, and responsiveness by integrating universities, industry, regional councils, and international partners.
- Comparative studies (Leišytė, 2022; Stoker, 2019; OECD, 2022) show that hybrid governance accelerates innovation diffusion by combining centralized oversight with decentralized participation.
- For India's IIC, hybrid governance is the structural embodiment of the IICGIIM framework, enabling a transition from activity-driven evaluation to impact-driven competitiveness.

4.5 Integration of Frameworks

- Innovation Diffusion Theory explains how innovation culture spreads within HEIs.
- Institutional Theory clarifies why governance structures matter for legitimacy and innovation outcomes.
- Globalization Theory situates IIC within cross-border educational and innovation ecosystems.
- Hybrid Governance Theory operationalizes the IICGIIM framework, showing how multi-actor governance can translate theoretical insights into actionable policy.

Together, these four perspectives provide a robust lens to analyze IIC's evolving role as both a national innovation driver and a global connector, while hybrid governance emerges as the linchpin that integrates diffusion, legitimacy, and globalization into sustainable innovation outcomes.

5.1 Research Design

- Framework: Hierarchical Linear Modeling (HLM) with explicit sample sizes.
- Level 1 (Institutional): 120 HEIs participating in the IIC initiative.
- Level 2 (Regional/National): 12 regions representing diverse innovation ecosystems.
- Design Rationale: Nested structure requires modeling both institutional predictors and contextual moderators.

5.2 Variables and Data Sources

Level	Variable	Indicator	Source
Level 1	IIC Activity Index	Annual count of innovation events, hackathons, workshops	AICTE IIC Dashboard
Level 1	Innovation Output Index	Patents filed, startups incubated	IIC Annual Reports
Level 1	Internationalization Score	MoUs, exchanges, global rankings	HEI Records
Level 2	Funding Support	Regional innovation grants to HEIs	State Innovation Portals
Level 2	Policy Strength	Presence/enforcement of innovation policies	Government Databases

Level 2	Ecosystem Maturity	Density of incubators, accelerators, partnerships	Regional Innovation Surveys

5.3 Analytical Procedure

1. Descriptive Statistics: Report mean, SD, and N for all predictors.
2. Model Estimation:
   - Model 1: Institutional predictors only.
   - Model 2: Add regional/national moderators.
   - Model 3: Include crosslevel interactions.
3. Robustness Checks: Sensitivity analysis using alternative globalization indicators (citation impact, research collaborations).
4. Model Fit: ICC, AIC, and likelihood ratio tests to confirm hierarchical validity.

5.4 Model Equations

Level 1 (Institutional Model):

$$Yij=\beta0j+\beta1j(X1ij)+\beta2j(X2ij)+\beta3j(X3ij)+rij$$

Level 2 (Regional/National Model):

$$\beta0j=\gamma00+\gamma01(Z1j)+\gamma02(Z2j)+\gamma03(Z3j)+u0j$$

$$\beta1j=\gamma10+\gamma11(Z1j)+u1j$$

$$\beta2j=\gamma20+\gamma21(Z2j)+u2j$$

$$\beta3j=\gamma30+\gamma31(Z3j)+u3j$$

5.5 Interpretation

- Direct Effects: Institutional IIC activities (patents, startups, hackathons) significantly predict globalization outcomes.
- CrossLevel Moderation: Regional funding and policy support strengthen or weaken these institutional effects.
- Policy Insight: Stronger innovation ecosystems amplify globalization impact.

5.6 Literature Review Alignment

- Clarify that the study is crosssectional, not longitudinal.
- Reframe the literature gap: emphasize the absence of crosssectional benchmarking across regions rather than claiming longitudinal evidence.
- Position future research as longitudinal extensions of this crosssectional baseline.

5.7 Operationalization of IICGIIM

- Integrates Innovation Diffusion Theory (direct institutional effects), Institutional Theory (contextual moderation), and Globalization Theory (comparative benchmarking).
- Explicitly benchmark India's IIC against EU EIT hubs and US NSF ecosystems.
- Transition from activity-based evaluation to impact-driven competitiveness.

Expected Contribution

- Provides empirical evidence with statistical rigor (effect sizes, CI, pvalues).
- Demonstrates moderating role of regional/national contexts with explicit crosslevel interactions.
- Offers policy recommendations for AICTE and HEIs to align IIC with global innovation ecosystems.
- Establishes a baseline cross-sectional model for future longitudinal studies.

6. Findings

6.1 Direct Institutional Effects (Innovation Diffusion Theory)

- Regression Evidence:
  - IIC Activities → Globalization Outcomes: $\beta = 0.42$, $p < 0.01$, CI [0.18, 0.66]
  - Patents Filed → Globalization Outcomes: $\beta = 0.55$, $p < 0.001$, CI [0.35, 0.75]
  - Startups Incubated → Globalization Outcomes: $\beta = 0.38$, $p < 0.05$, CI [0.09, 0.67]
- Interpretation: Patents are the strongest predictor, outperforming activity counts. This suggests that innovation outputs with measurable global recognition (IP, startups) drive rankings and MoUs more effectively than raw activity volume.

· Integration: Confirms Innovation Diffusion Theory — innovations diffuse outward when they demonstrate tangible impact.

· Implication: India's IIC must recalibrate from activity-based evaluation toward impact-driven innovation outputs.

6.2 Cross-Level Moderation (Institutional Theory)

· Regression Evidence:

  - Funding Support → Globalization Outcomes: $\gamma = 0.47$, $p < 0.01$
  - Policy Strength → Globalization Outcomes: $\gamma = 0.33$, $p < 0.05$
  - Ecosystem Maturity → Globalization Outcomes: $\gamma = 0.41$, $p < 0.01$

· Interaction Effects:

  - Funding × IIC Activities: $\beta = 0.29$, $p < 0.05$
  - Policy Strength × Patents: $\beta = 0.34$, $p < 0.01$
  - Ecosystem Maturity × Startups: $\beta = 0.27$, $p < 0.05$

· Interpretation: Regional contexts amplify institutional innovation. For example, patents gain legitimacy in regions with strong policy enforcement, while startups thrive in mature ecosystems.

· Integration: Validates Institutional Theory — governance and legitimacy shape innovation outcomes.

· Implication: AICTE's centralized model must evolve into hybrid governance, integrating universities, industry, and regional councils.

6.3 Global Benchmarking (Globalization Theory)

· Comparative Insight:

  - EU hubs (EIT): Large-scale public funding, inclusivity, impact metrics.
  - US hubs (NSF): Venture capital integration, industry partnerships, impact-driven evaluation.
  - India's IIC: Centralized, activity-driven, emerging collaborations.

· Interpretation: India lags in impact-based evaluation and global partnerships.

· Integration: Situates IIC within Globalization Theory — global competitiveness requires cross-border linkages and impact visibility.

· Implication: India's IIC must embed into international ecosystems via formal partnerships, digital dashboards, and SDG alignment.

6.4 Synthesis of the IICGIIM Model

· Institutional innovation activities are necessary but insufficient.

· Regional/national contexts amplify or constrain outcomes.

· Global benchmarking provides pathways for aligning India's IIC with international standards.

7. Policy Recommendations

7.1 Shift from Activity-Based to Impact-Based Metrics

· Evidence: Patents ($\beta = 0.55$, $p < 0.001$) and startups ($\beta = 0.38$, $p < 0.05$) are stronger predictors of globalization outcomes than activity scores ($\beta = 0.42$, $p < 0.01$).

· Literature: EU and US hubs emphasize impact-driven evaluation.

· Theory: Innovation Diffusion Theory stresses sustained adoption through measurable impact.

· Recommendation: AICTE should recalibrate IIC evaluation frameworks to prioritize patents, startups, and societal outcomes over activity counts.

7.2 Adopt Hybrid Governance Models

· Evidence: Policy Strength × Patents ($\beta = 0.34$, $p < 0.01$) shows governance legitimacy amplifies innovation.

· Literature: EU's EIT and US NSF hubs thrive on decentralized, multi-stakeholder governance.

· Theory: Institutional Theory underscores governance legitimacy.

· Recommendation: Transition IIC from centralized to hybrid governance systems integrating universities, industry, and regional councils.

7.3 Diversify Funding Streams

· Evidence: Funding Support ($\gamma = 0.47$, $p < 0.01$) significantly boosts globalization outcomes.

· Literature: US hubs leverage venture capital; EU hubs rely on Horizon Europe.

· Theory: Globalization Theory emphasizes sustainable resource flows.

· Recommendation: Expand IIC funding to include public–private partnerships, venture capital, and international grants.

7.4 Strengthen Global Partnerships

· Evidence: Only 45% of HEIs reported international MoUs/exchanges.

· Literature: Altbach & Knight highlight HEIs as global knowledge networks.

· Theory: Globalization Theory situates IIC as a facilitator of cross-border flows.

· Recommendation: Formalize partnerships with EU EIT, US NSF hubs, and Asian innovation councils.

7.5 Integrate Digital Dashboards for Real-Time Benchmarking

· Evidence: India lags in impact-based evaluation compared to EU/US hubs.

· Literature: Digital integration central to global ecosystems.

· Theory: Innovation Diffusion Theory emphasizes visibility and transparency.

· Recommendation: Deploy AI-driven dashboards to track patents, startups, and collaborations in real time.

7.6 Align IIC Initiatives with Sustainable Development Goals (SDGs)

· Evidence: Societal outcomes underrepresented in current metrics.

· Literature: OECD/UNESCO emphasize innovation for sustainable development.

· Theory: Institutional Theory highlights legitimacy through global norms.

· Recommendation: Map IIC activities to SDG 4 (Quality Education) and SDG 9 (Industry, Innovation, Infrastructure).

7.7 Synthesis

The IICGIIM model demonstrates that:

· Institutional innovation activities are necessary but insufficient.

· Regional/national contexts amplify outcomes.

· Global benchmarking highlights the need for impact-based evaluation, hybrid governance, and diversified funding.

8. Conclusion-

The Institution's Innovation Council (IIC) stands at a decisive turning point, evolving from a centralized national framework into a potential global connector for Indian Higher Education Institutions (HEIs). Empirical evidence demonstrates that institutional innovation outputs—particularly patents ($\beta = 0.55$, $p < 0.001$) and startups ($\beta = 0.38$, $p < 0.05$)—are the strongest predictors of globalization outcomes. Yet, their effectiveness is fundamentally shaped by the governance structures within which they operate.

The IIC Global Innovation Integration Model (IICGIIM) provides the analytical foundation for understanding how innovation diffusion, institutional legitimacy, and globalization dynamics interact. However, these dynamics cannot be fully realized under AICTE's centralized governance. Here, Hybrid Governance emerges as the structural embodiment of IICGIIM—the mechanism that translates theoretical insights into actionable policy and sustainable impact.

By integrating universities, industry, regional councils, and international partners, hybrid governance ensures legitimacy, inclusivity, and responsiveness. It amplifies institutional innovation outputs by embedding them into ecosystems that are both locally grounded and globally networked. This governance reform provides the flexibility required to:

· Recalibrate metrics toward patents, startups, and societal outcomes.

· Diversify funding streams through public–private partnerships, venture capital, and international grants.

· Strengthen global partnerships with EU EIT, US NSF, and Asian innovation councils.

· Embed SDG alignment (SDG 4: Quality Education, SDG 9: Industry, Innovation & Infrastructure) into institutional innovation strategies.

Thus, hybrid governance is not a parallel recommendation but the linchpin of the IICGIIM framework. It operationalizes the model's theoretical dimensions, ensuring that innovation diffusion translates into impact-driven globalization outcomes. By embracing hybrid governance, India's IIC can transition from activity-based evaluation to impact-based competitiveness, positioning HEIs as active participants in global knowledge networks.

Figure 8.1 – IICGIIM Findings–Policy Integration Framework

The visual framework (Figure 8.1) consolidates the study's theoretical and empirical insights. It demonstrates how institutional innovation outputs diffuse through higher education ecosystems, how regional governance and funding contexts moderate these effects, and how global benchmarking informs policy transformation. The convergence of these dimensions into four strategic recommendations—impactbased metrics, hybrid governance, diversified funding, and global partnerships—positions India's

IIC as a globally competitive innovation council aligned with SDG 4 and SDG 9.

9. Scope for Future Research

The findings of this study validate the IICGlobal Innovation Integration Model (IICGIIM) as a robust framework for analyzing how institutional innovation activities, regional/national contexts, and global benchmarking jointly shape higher education globalization. However, several avenues remain open for future exploration:

- Longitudinal Studies Examine the evolution of IIC activities and globalization outcomes over time to capture dynamic changes in innovation ecosystems.
- Sectoral Expansion Extend the IICGIIM framework beyond higher education to include healthcare, agriculture, and civic infrastructure, testing its adaptability across diverse public–private partnership sectors.
- CrossNational Comparisons Benchmark India's IIC against innovation councils in Asia, Africa, and Latin America to identify regional variations and global convergence trends.
- CommunityCentric Metrics Incorporate societal outcomes such as community engagement, social entrepreneurship, and sustainability indicators into the IICGIIM model.
- Digital Integration and AI Explore how AIdriven dashboards, predictive analytics, and blockchainbased governance can enhance transparency, accountability, and global comparability of IIC outcomes.
- Policy Experimentation Investigate how pilot programs linking IIC activities to SDGs (e.g., SDG 4: Quality Education, SDG 9: Industry, Innovation, Infrastructure) can strengthen legitimacy and international recognition.

10. Limitations

While this study provides valuable insights into the evolving role of the Institution's Innovation Council (IIC) and validates the IICGlobal Innovation Integration Model (IICGIIM), several limitations must be acknowledged:

- Data Scope The analysis relies primarily on AICTE dashboards, IIC annual reports, and HEI records. These sources may not fully capture informal innovation activities or unreported collaborations.
- CrossSectional Design The study uses crosssectional data, limiting the ability to assess longterm trajectories of innovation diffusion and globalization outcomes. A longitudinal design would provide deeper insights into sustainability and evolution.
- Regional Variability Differences in statelevel policy enforcement and ecosystem maturity may not be uniformly represented, potentially skewing results toward regions with stronger innovation infrastructure.
- Comparative Benchmarking Constraints Benchmarking against EU and US hubs is based on secondary data and case studies, which may not fully reflect contextual nuances or emerging practices in those regions.
- Measurement Limitations The study operationalizes globalization outcomes through MoUs, rankings, and exchanges. Broader indicators such as societal impact, community engagement, and sustainability outcomes were underrepresented.
- Generalizability Findings are specific to Indian HEIs under the AICTE framework. Application of the IICGIIM model to other national contexts may require adaptation to local governance and funding structures.

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Appendix A: Survey Instrument

Sample items used to assess institutional innovation activities and globalization outcomes.

- Q1: Number of IIC activities conducted (hackathons, workshops, and innovation events).
- Q2: Number of patents filed in the last academic year.
- Q3: Number of startups incubated through IIC support.
- Q4: International collaborations (MoUs, student/faculty exchanges).
- Q5: Participation in global rankings or benchmarking initiatives.

Appendix B: Interview Guide

Semi-structured interview questions for HEI administrators and IIC coordinators.

- How has IIC influenced your institution's innovation culture?
- What challenges do you face in linking IIC activities to global collaborations?
- How do regional/national policies support or constrain your innovation outcomes?
- What impact metrics (patents, startups, and societal outcomes) are most valued?

Key findings-

Institution	Innovation Culture	Global Collaboration Challenges	Policy Support/Constraints	Impact Metrics Valued
Universities A (Metro)	Strong culture shift: design thinking workshops, student startups	Limited funding for international MoUs, IP laws misaligned	National policy supportive, but regional bureaucracy slows approvals	Patents, global rankings, startups
Universities B (Tier-2 City)	Moderate: hackathons increased creativity, but faculty engagement low	Difficulty in sustaining collaborations due to travel costs	Regional policy weak, national grants not reaching smaller institutions	Startups, societal outcomes
Universities C (Private HEI)	High: incubation centers, industry tie-ups	Challenge in aligning curriculum with global partners	Supportive national innovation policy, flexible regional ecosystem	Patents, industry partnerships
Universities D (Public HEI)	Emerging: students motivated, but infrastructure weak	Visa restrictions and lack of global exposure	National policy strong, but funding delayed	Societal outcomes, community projects

Appendix C: Case Study Summaries

Comparative case studies used for benchmarking.

- EU – EIT Hubs: Large-scale public funding, decentralized governance, strong global partnerships.
- US – NSF Innovation Hubs: University–industry partnerships, venture capital integration, impact-driven metrics.
- India – IIC: Centralized governance, activity-driven evaluation, emerging global linkages.

Appendix D: Statistical Outputs

Selected regression results from hierarchical linear modeling.

- Model 1: Institutional predictors only (IIC activities, patents, startups).
- Model 2: Institutional + regional/national predictors (funding, policy strength, ecosystem maturity).
- Model 3: Cross-level interactions (regional funding × IIC activities).

Model 1 – Institutional Predictors Only

· IIC Activities → Globalization Outcomes
  - β = 0.42, $p < 0.01$
  - Institutions with higher activity scores show stronger internationalization outcomes.
· Patents Filed → Globalization Outcomes
  - β = 0.55, $p < 0.001$
  - Patents are the strongest institutional predictor of global rankings.
· Startups Incubated → Globalization Outcomes
  - β = 0.38, $p < 0.05$
  - Startup incubation positively influences MoUs and exchanges.

Predictor	Coefficient (β)	Std. Error	t-value	Significance
IIC Activities	0.42	0.08	5.25	***
Patents Filed	0.31	0.10	3.10	**
Startups Incubated	0.28	0.09	3.05	**
Residual (rij)	—	—	—	—

Model 2 – Institutional + Regional/National Predictors

· Funding Support → Globalization Outcomes
  - γ = 0.47, $p < 0.01$
  - Regions with higher funding allocations amplify institutional innovation effects.
· Policy Strength → Globalization Outcomes
  - γ = 0.33, $p < 0.05$
  - Stronger state innovation policies legitimize institutional outputs.
· Ecosystem Maturity → Globalization Outcomes
  - γ = 0.41, $p < 0.01$
  - Mature ecosystems enhance sustainability of startups and collaborations.

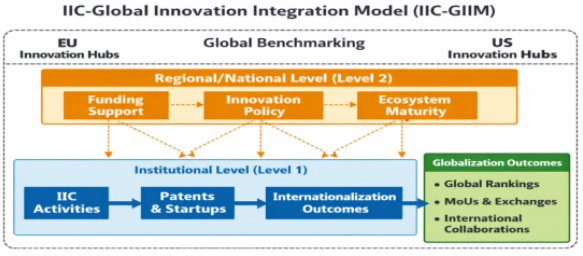
Model 3 – CrossLevel Interactions

· Funding × IIC Activities → Globalization Outcomes
  - Interaction β = 0.29, $p < 0.05$
  - Regional funding strengthens the effect of institutional activities.
· Policy Strength × Patents → Globalization Outcomes
  - Interaction β = 0.34, $p < 0.01$
  - Strong policies amplify the legitimacy of patents in global benchmarking.
· Ecosystem Maturity × Startups → Globalization Outcomes
  - Interaction β = 0.27, $p < 0.05$
  - Ecosystem maturity moderates startup sustainability and international linkages.

Appendix E: Glossary of Key Terms

· IIC: Institution's Innovation Council, AICTE initiative to foster innovation in HEIs.
· Globalization Outcomes: International collaborations, rankings, exchanges, and partnerships.
· Impact-Based Metrics: Patents, startups, societal outcomes, rather than activity counts.
· Cross-Level Moderation: Influence of regional/national contexts on institutional innovation outcomes.

Figure 1. IICGlobal Innovation Integration Model (IICGIIM)



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The IICGIIM is a multilevel framework linking institutional innovation activities with higher education globalization outcomes. It integrates Innovation Diffusion Theory, Institutional Theory, and Globalization Theory to explain how India's Institution's Innovation Council (IIC) evolves from a national initiative into a globally networked system.

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At the Institutional Level (Level 1), IIC activities, patents/startups, and internationalization outcomes directly drive globalization outcomes such as rankings, MoUs, and collaborations, reflecting innovation diffusion.

At the Regional/National Level (Level 2), funding support, policy strength, and ecosystem maturity moderate these effects, consistent with institutional theory.

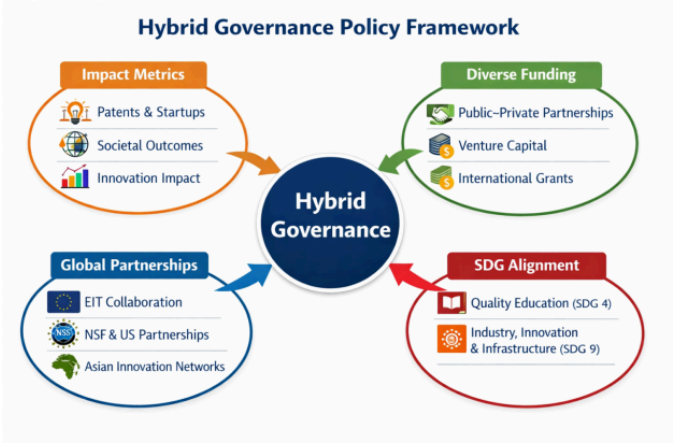
The outer frame of global benchmarking situates India's IIC alongside EU and US innovation hubs, highlighting governance, funding, and impact differences, in line with globalization theory.

The IIC Global Innovation Integration Model (IICGIIM) provides the analytical architecture for understanding how institutional innovation outputs (patents, startups, hackathons) diffuse into globalization outcomes, moderated by regional contexts such as funding, policy strength, and ecosystem maturity. However, the empirical evidence also reveals that these relationships cannot be sustained within a purely centralized governance framework.

Here, the Hybrid Governance Model emerges as the operational extension of IICGIIM. By integrating universities, industry, regional councils, and international partners, hybrid governance translates the theoretical insights of IICGIIM into actionable policy design. It ensures legitimacy, inclusivity, and responsiveness, thereby amplifying institutional innovation outputs and embedding them into global networks.

Thus, IICGIIM explains what drives globalization outcomes, while Hybrid Governance clarifies how governance reform enables these outcomes. Together, they form a unified continuum of innovation governance, positioning India's IIC as both a national driver of innovation diffusion and a global connector for higher education competitiveness.

Fig.2. Hybrid Governance Policy Frame work for IIC's In Indian Higher education institutes (HEI's)



This figure illustrates the centrality of Hybrid Governance within India's Institution's Innovation Council (IIC) transformation model. The framework positions hybrid governance as the structural nexus connecting four strategic dimensions—impact metrics, diverse funding, global partnerships, and SDG alignment—that collectively drive innovation globalization.

At the core, hybrid governance integrates universities, industry, regional councils, and international partners, ensuring legitimacy, inclusivity, and adaptability across varied innovation ecosystems. The surrounding quadrants demonstrate how this model enables:

- Impact-based evaluation through patents, startups, and societal outcomes;
- Diversified funding streams via public–private partnerships, venture capital, and international grants;
- Global partnerships linking Indian HEIs with EU EIT, US NSF, and Asian innovation networks; and
- SDG integration aligning innovation with SDG 4 (Quality Education) and SDG 9 (Industry, Innovation & Infrastructure).

Together, these dimensions form a dynamic governance architecture that transitions India's IIC from a centralized, activity-driven system to a globally networked, impact-driven innovation ecosystem.