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# University–Industry–Government Collaboration in Fostering Innovation: Policy Solutions to Strengthen Triple Helix Partnerships in Ho Chi Minh City in The Digital Era

Võ Thị Thu Hồng[1]; Nguyễn Vũ Hiếu Trung[2]; Pham Thị Luyến[3]

[1,2]PhD.

[1,3]The Saigon International University (SIU)
[2]University of Management and Technology, HCMC (UMT)

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**Abstract: In the context of the knowledge economy and the Fourth Industrial Revolution, the Triple Helix model—linking universities, industry, and government—is recognized as an effective framework for promoting innovation, enhancing competitiveness, and fostering sustainable development. This paper analyzes the implementation of the Triple Helix model in global innovation hubs such as Kendall Square (USA), Fraunhofer (Germany), Yozma (Israel), one-north (Singapore), Catapult (UK), Brainport Eindhoven (Netherlands), and Shenzhen (China). Based on qualitative analysis, the study evaluates the current state of Triple Helix collaboration in Ho Chi Minh City (HCMC) and identifies its strengths and limitations. Findings indicate that although HCMC possesses strong infrastructure, human resources, and an emerging startup ecosystem, challenges remain in governance, financing mechanisms, intellectual property frameworks, and sustained collaboration. The study proposes four policy pillars for 2025–2030: (1) establishing a central orchestrator for coordination, (2) reforming financial mechanisms and policy support, (3) developing innovation infrastructure and shared spaces, and (4) improving legal frameworks, KPIs, and international linkages. Academically, the paper extends Triple Helix theory to the context of an emerging metropolitan economy; practically, it offers concrete policy recommendations for HCMC to become a leading innovation hub in Southeast Asia.**

***Keywords****: Triple Helix, Innovation, University–Industry–Government Collaboration, Ho Chi Minh City, International Experience, Innovation Policy.*

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## I. INTRODUCTION

Innovation has become a critical driver of economic growth and competitiveness, particularly amid the Fourth Industrial Revolution and rapid digital transformation (OECD, 2023). Numerous studies emphasize that innovation outcomes depend not only on the internal capabilities of individual actors but also on effective interaction and collaboration among key stakeholders within an ecosystem—most notably universities and research institutes, businesses, and government agencies (Etzkowitz & Leydesdorff, 2000).

- *The Triple Helix model highlights the reconfiguration of roles among the three pillars:*

- Universities go beyond education and basic research to engage in entrepreneurship and knowledge commercialization.
- Industry is not only an end-user of technologies but also a co-creator and co-investor in research and development (R&D).
- Government shifts from a regulatory role to that of an enabler, coordinator, and provider of resources and favorable legal frameworks.

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Global innovation hubs such as Kendall Square (USA), Fraunhofer (Germany), and Brainport Eindhoven (Netherlands) illustrate how Triple Helix interactions create an "overlay of communications" that fosters hybrid organizations (e.g., Technology Transfer Offices, corporate labs, innovation districts) to accelerate the pathway from ideas to commercialization.

In Vietnam, Ho Chi Minh City (HCMC) serves as the nation's economic hub, contributing approximately 23% of national GDP and leading in the number of innovative startups (NIC, 2023). While the city has established several Triple Helix nuclei, including the Saigon Hi-Tech Park (SHTP) and the Saigon Innovation Hub (SIHUB), collaboration remains suboptimal. Current challenges include the absence of a regional coordinating body, fragmented financial mechanisms for R&D, lack of standardized performance indicators, and short-term project-based cooperation.

➢ *This Study Therefore Aims to:*

- Synthesize international experiences in implementing the Triple Helix model.
- Assess the current state and influencing factors of Triple Helix collaboration in HCMC.
- Propose feasible policy solutions for the period 2025–2030.

The research employs a mixed-method approach: qualitative analysis of literature and international case studies, complemented by a survey of 280 stakeholders from universities, businesses, and government agencies.

## II. LITERATURE REVIEW

➢ *Theoretical foundation of the Triple Helix*

The Triple Helix framework, proposed by Etzkowitz and Leydesdorff (1995, 2000), conceptualizes dynamic interactions among universities, industry, and government in driving innovation and knowledge-based economic development. A key feature is the "hybridization" of functions, whereby stakeholders transcend traditional roles to establish hybrid organizations such as technology transfer offices, public–private laboratories, and innovation districts.

- *Its Mechanisms Rest On Three Principles:*

✓ *Overlapping roles*

Stakeholders jointly engage in research, development, and commercialization.

✓ *Enhanced interaction*

Continuous channels of dialogue and collaboration are established.

✓ *Flexible organizational structures*

Enabling adaptive and diverse forms of cooperation across innovation stages.

Building on this foundation, Etzkowitz & Zhou (2017) further describe the "overlay of communications" that produces hybrid organizations to accelerate commercialization. Extensions include the Quadruple Helix (adding civil society) and Quintuple Helix (adding the environment) (Carayannis & Campbell, 2009; Ranga & Etzkowitz, 2013). Nevertheless, the Triple Helix remains the fundamental framework for analyzing tripartite collaboration.

➢ *International case studies*

- *Kendall Square (USA)* exemplifies an innovation district with MIT at its core, tightly connected with global corporations (Google, Pfizer, Novartis) and supported by state policies on infrastructure and talent attraction.
- *Fraunhofer Society (Germany)* illustrates state–industry co-financing of R&D, with the government ensuring long-term funding while firms shape research priorities.
- *Yozma Program (Israel)* highlights the effectiveness of hybrid public–private venture capital in catalyzing a global high-tech cluster.
- *one-north (Singapore) and Catapult Centres (UK)* showcase how physical infrastructure, co-working spaces, and mentoring networks attract global talent and startups.
- *Brainport Eindhoven (Netherlands)* demonstrates governance networks where government, universities, and firms co-design regional strategies and share risks and benefits.

➢ *ASEAN Experiences*

Singapore leads regional Triple Helix implementation through its Research, Innovation, and Enterprise (RIE) policies. Malaysia established Cyberjaya with tax incentives and national R&D funds (Ng & Thiruchelvam, 2012). Thailand's Eastern Economic Corridor of Innovation (EECi) promotes collaboration in biotech, AI, and materials science.

➢ *Vietnam Studies*

Vietnamese research highlights the potential and challenges of Triple Helix adoption (Nguyen et al., 2020; Le & Tran, 2022). Key issues include shallow university–industry collaboration, unstable government support, and the absence of a strong intermediary body to sustain cooperation.

## III. CURRENT SITUATION OF TRIPLE HELIX COLLABORATION IN HO CHI MINH CITY

➢ *Overview of HCMC's innovation ecosystem*

HCMC contributes 22–23% of Vietnam's GDP and nearly 30% of state budget revenues (HCMC People's Committee, 2024). The city concentrates over 60% of national innovative startups (NIC, 2023).

- *Its Innovation Ecosystem Includes:*

✓ *Saigon Hi-Tech Park (SHTP)*

Home to global high-tech corporations and R&D centers.

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✓ *Thu Duc Innovation District* (under development)
Linking Vietnam National University-HCMC, SHTP, and creative urban zones.

✓ *Universities and Research Institutes*
Such as VNU-HCMC, HCMC University of Technology, UEH, and Pasteur Institute.

✓ *Startup ecosystem*
1,600 startups (2024), incubators (SIHUB, BK-Holdings), and venture funds.

✓ *Government support agencies*
HCMC Department of Science and Technology, SIHUB, CESTI.

Despite these strengths, HCMC ranks only average within ASEAN on R&D collaboration and commercialization metrics (iDX Index, 2023).

➢ *Current Status by Pillar*

- *Universities and Research Institutes*

Universities in HCMC play a central role in high-level human resource training and scientific research. During 2021–2024, the number of R&D projects involving university–industry collaboration steadily increased, indicating an expanding trend of applied research.

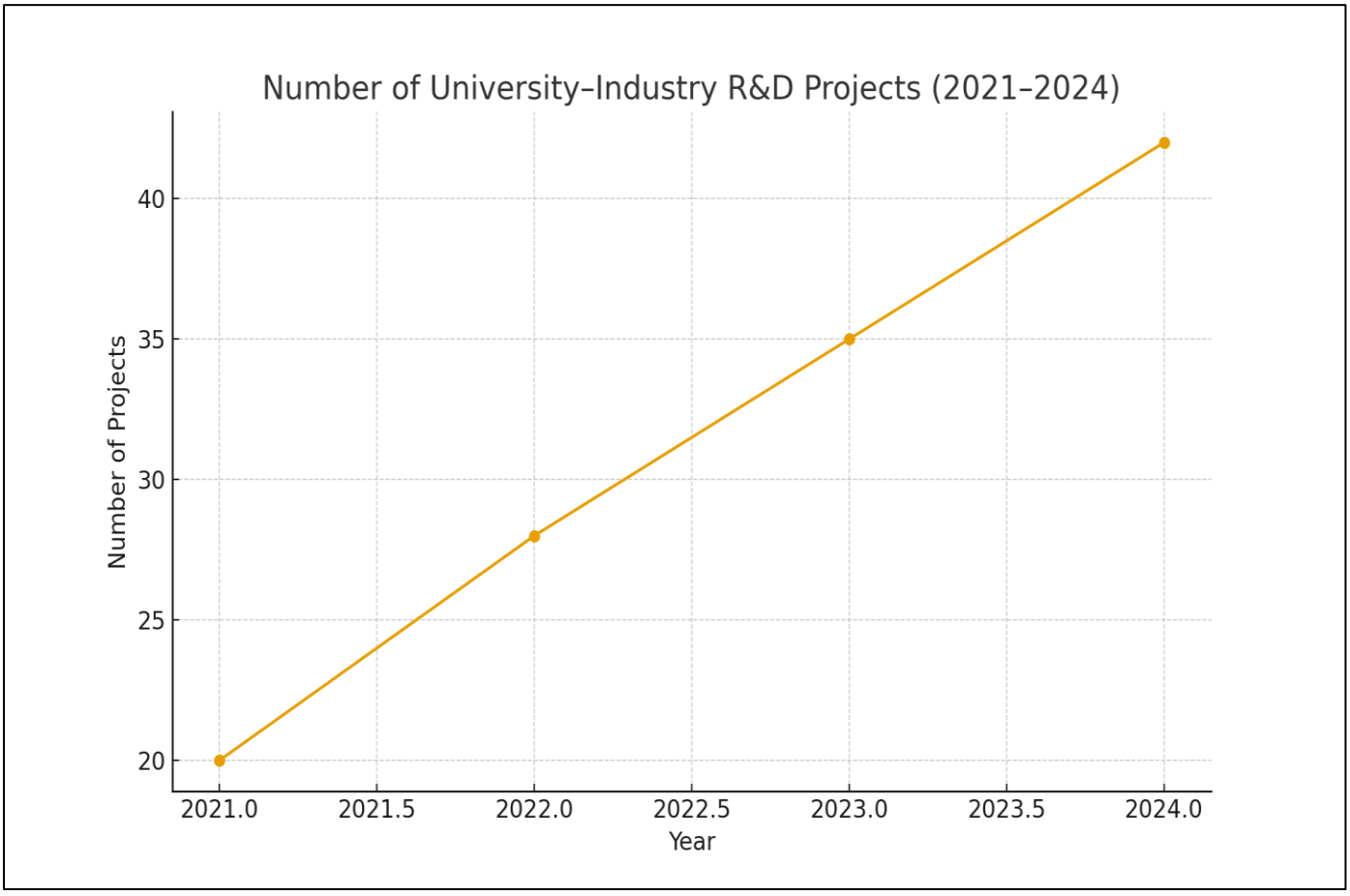


Fig 1. Number of R&D Projects Involving University–Industry Collaboration, 2021–2024
(Source: HCMC Department of Science and Technology, 2023)

As shown in Figure 1, joint research projects between universities and enterprises have grown consistently. This reflects a shift from universities' traditional focus on basic research toward more application-oriented studies tailored to business needs.

Additionally, international publications (Scopus, WoS) by VNU-HCMC increased by an average of 12% per year. Collaborative projects with enterprises have also expanded, such as BK Holdings–Samsung in new materials and UEH–Saigon tourist in smart tourism.

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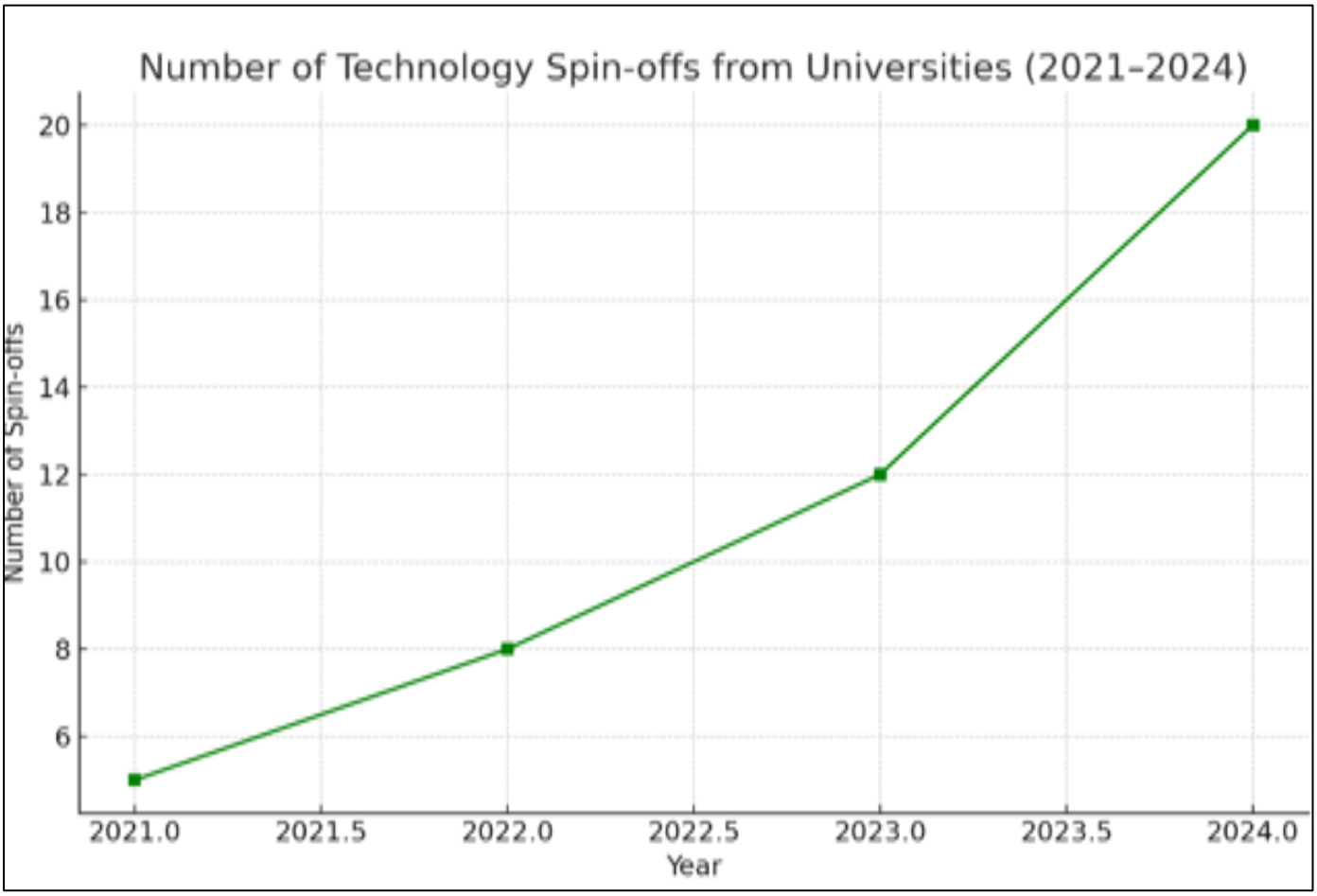


Fig 2 Number of Technology Spin-Offs From Universities, 2021–2024
(Source: VNU-HCMC, 2024)

Figure 2 demonstrates that the number of technology spin-offs originating from universities doubled within four years, highlighting the growing capacity for commercialization. This indicates progress toward the "entrepreneurial university," a key component of the Triple Helix model.

However, the proportion of research projects with enterprise partners remains low at only 18–20%, far below the >50% benchmark in developed countries.

✓ *Main Reasons Include:*

- Research funding still depends heavily on state budgets.
- Complex intellectual property (IP) sharing regulations prolong negotiations.
- Lack of corporate labs with co-funding and shared infrastructure.

- *Enterprises*

HCMC hosts over 500,000 registered businesses, the majority being SMEs. While some large corporations (FPT Software, VNG, Vinamilk, Saigon Newport) have established R&D centers or internal innovation units, only about 9–10% of SMEs report formal collaboration with universities/research institutes (NIC, 2023). On average, enterprises allocate less than 0.5% of revenue to R&D, much lower than the international benchmark of 2–5%.

✓ *Barriers include:*

- Limited awareness of universities' R&D capacities.
- Lack of financial risk-sharing mechanisms (e.g., public–private co-investment funds).
- SMEs' tendency to prioritize short-term business goals over long-term R&D.

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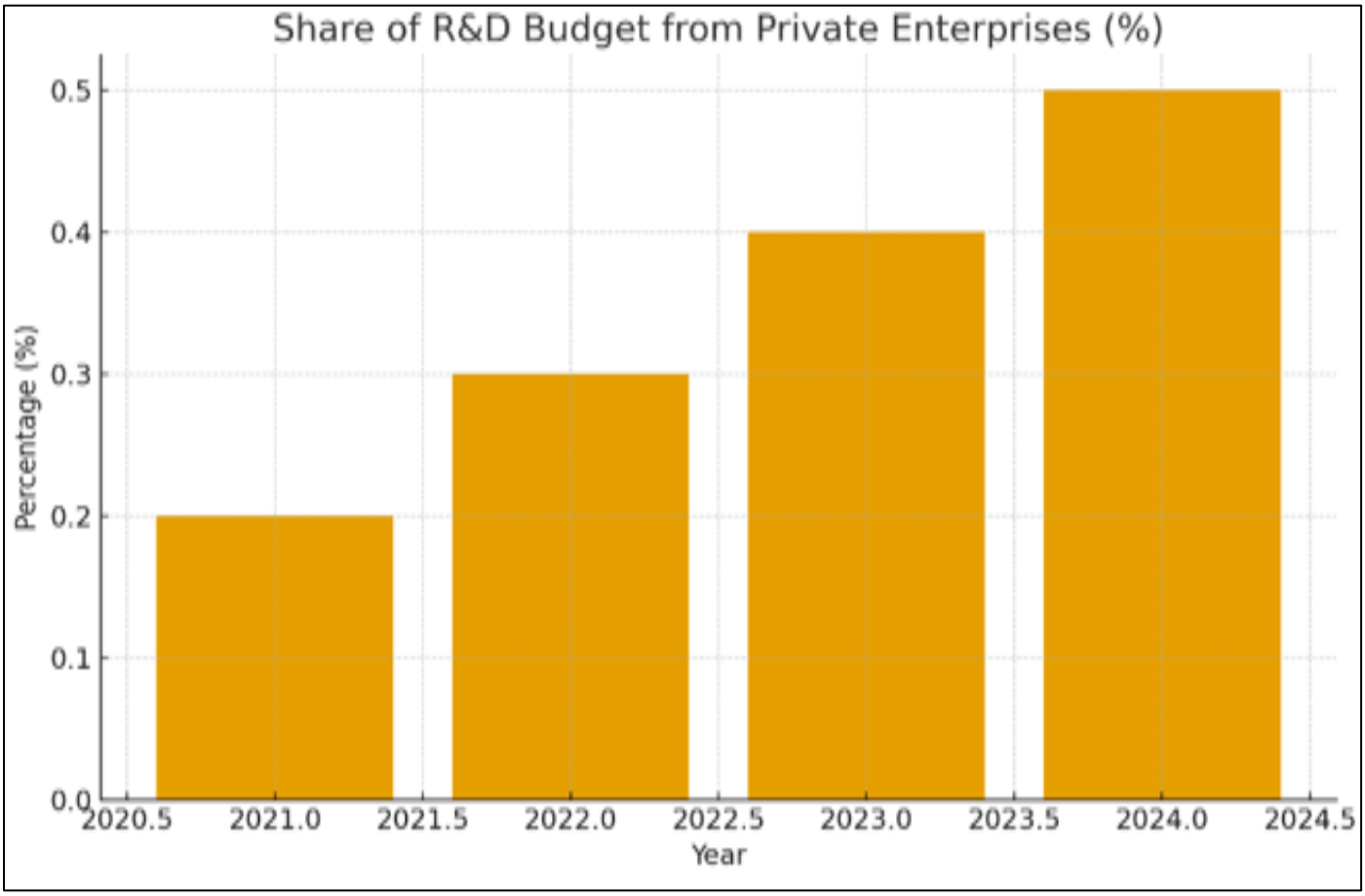


Fig 3. Share of R&D budget from private enterprises (%)
(Source: NIC, 2023)

Figure 3 shows a slight upward trend in private-sector R&D investment, reflecting growing awareness of innovation's importance. However, the share remains modest compared to global standards, underscoring insufficient private investment in R&D.

- *Government and regulatory agencies*

✓ The HCMC government has introduced several policies to foster innovation, including:

- The Program to Support the Commercialization of Research Outcomes (2022–2025).
- The HCMC Science and Technology Development Fund to finance R&D projects.
- Land lease exemptions and reductions in the Saigon Hi-Tech Park for high-tech projects.
- However, limitations persist:
- Funding remains fragmented and insufficient to create breakthroughs.
- A regional "orchestrator" with strong coordinating authority has not yet been established.
- Support programs are not fully aligned with market demand or the city's industrial strengths.

➢ *Forms of Triple Helix collaboration in HCMC*

Currently, university–industry–government (U–I–G) collaboration in HCMC takes three primary forms:

- *Research projects and technology transfer*:

Often initiated through enterprise contracts or government-funded programs. Example: an environmental sensor project between HCMC University of Technology and Saigon Water Company.

- *Incubation and startup programs*:

SIHUB and SHTP-IC frequently organize hackathons and innovation competitions, supported by the Department of Science and Technology and sponsored by enterprises.

- *Practice-oriented human resource training:*

Co-op education programs at universities such as UEH and HUTECH engage students in practical training with enterprises.

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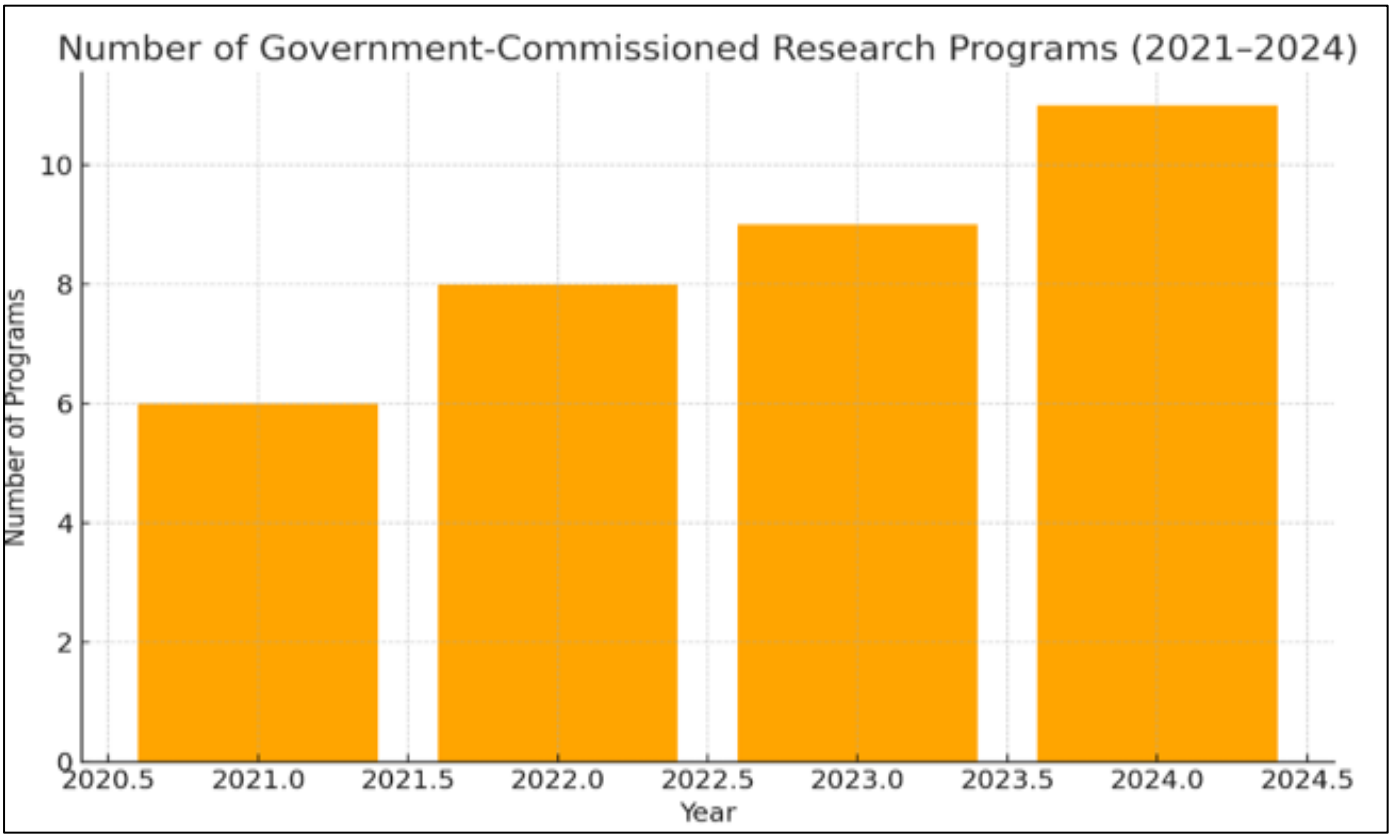


Fig 4. Number of government-commissioned research programs, 2020–2024
(Source: HCMC People's Committee, 2024)

Fig 4 indicates that the number of government-commissioned research programs increased from 6 to 11 between 2020 and 2024, showing policy efforts to institutionalize innovation. However, funding scales remain modest and insufficient for transformative impact.

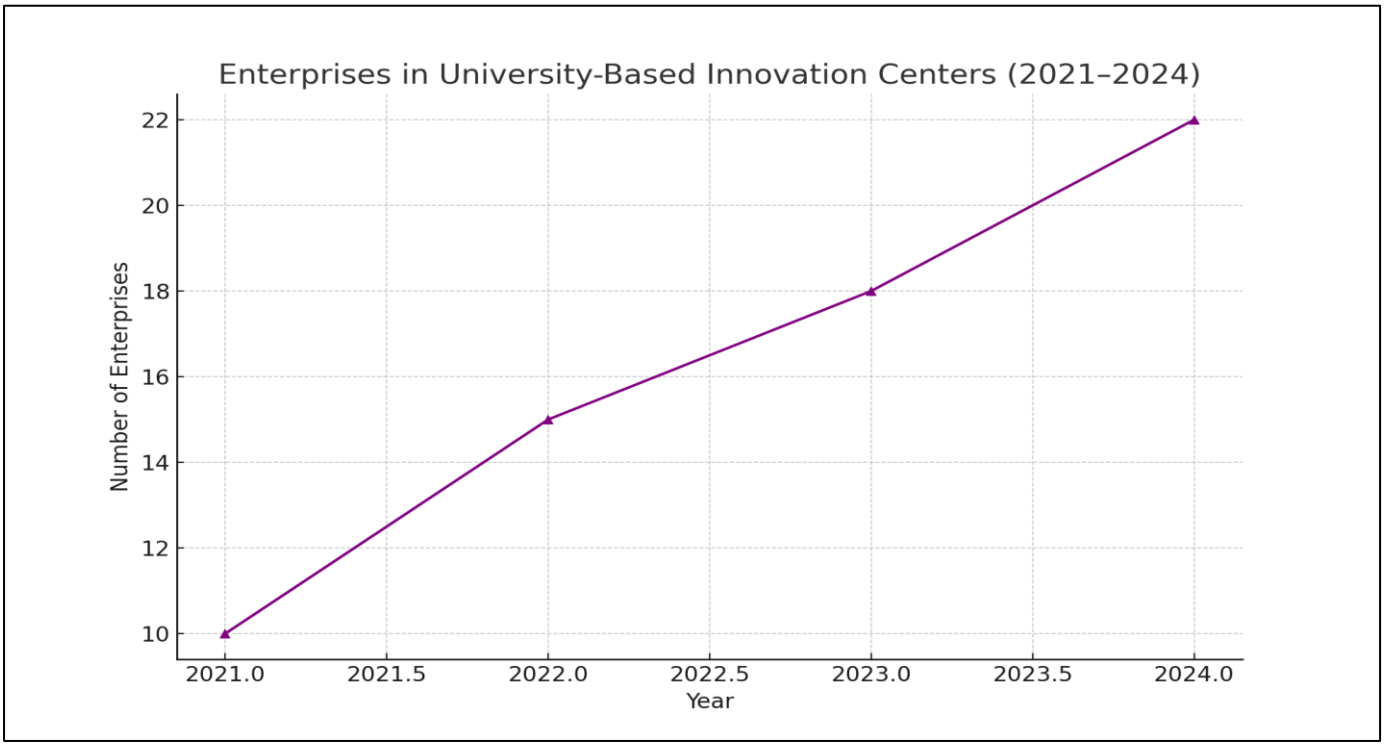


Fig 5. Number of enterprises participating in university-based innovation centers
(Source: SIHUB, 2023)

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Figure 5 illustrates that the number of enterprises directly participating in university-based innovation centers nearly doubled within a few years, demonstrating the effectiveness of shared innovation spaces and the strengthening of academic–industry linkages.

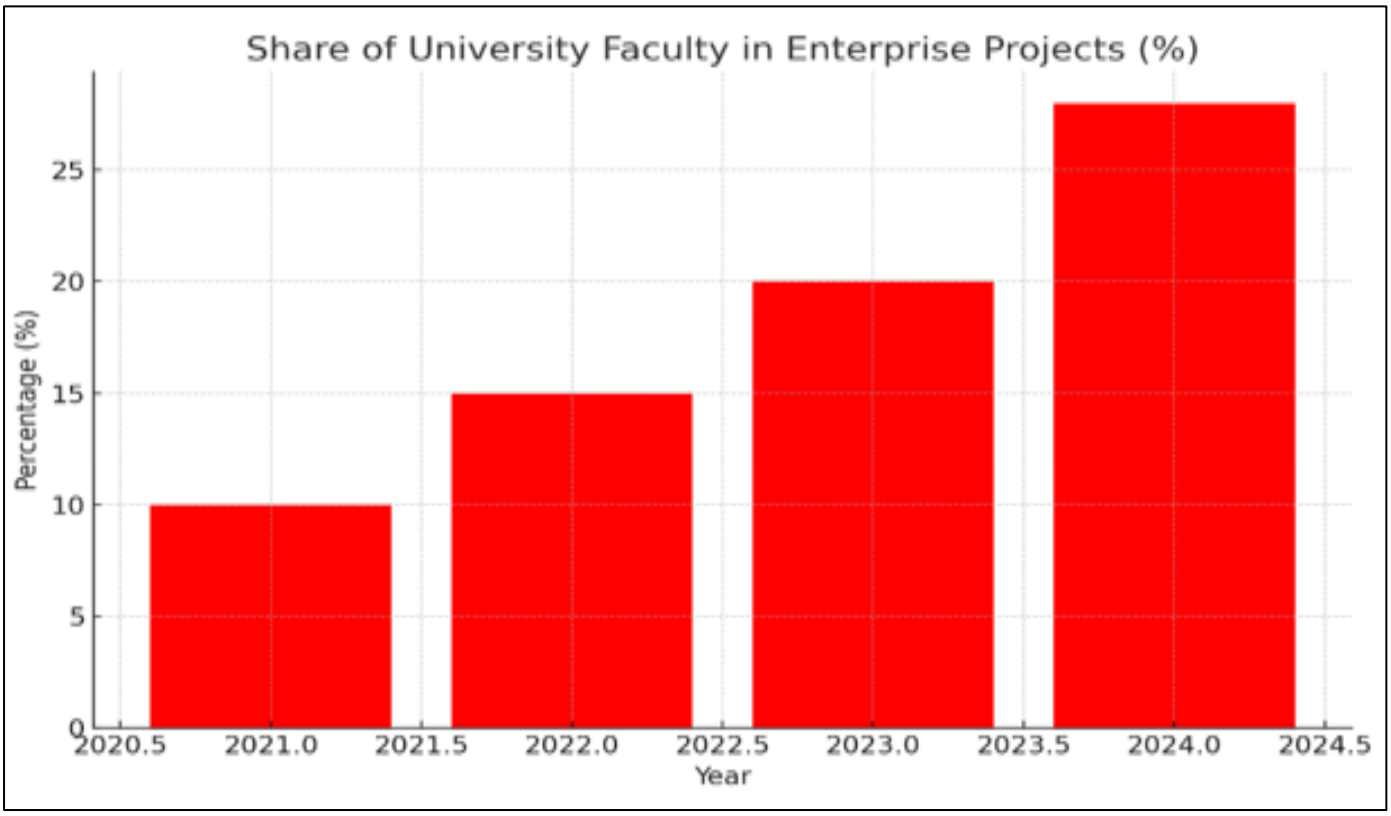


Fig 6. Share of university faculty participating in enterprise projects (%)
(Source: SIHUB, 2023)

As shown in Figure 6, the share of university faculty engaged in enterprise projects steadily increased, reflecting a stronger integration of academic expertise with practical business needs.

✓ Nevertheless, challenges remain:

- The share of R&D contracts jointly involving universities, enterprises, and government remains very low (<5% of total research contracts).
- No fully operational innovation district has yet been established as a physical hub for Triple Helix activities.
- Collaboration is still largely based on personal relationships and short-term projects, lacking institutionalization.

➢ *Strengths, Weaknesses, And Root Causes Strengths*

- *Strengths*

✓ Strong infrastructure and human resources (VNU-HCMC, SHTP, multiple R&D centers).
✓ Proactive local government experimenting with new models (e.g., Thu Duc Innovation District).
✓ A vibrant startup ecosystem with the highest density of startups nationwide.

- *Weaknesses*

✓ Lack of a strong orchestrator with adequate authority and resources.
✓ Fragmented and insufficient financial mechanisms; absence of risk-sharing models such as Yozma (Israel) or Fraunhofer (Germany).
✓ Intellectual property and benefit-sharing frameworks are underdeveloped, offering limited incentives for firms to collaborate.
✓ Lack of standardized KPIs and evaluation systems for measuring the impact of Triple Helix cooperation.
✓ Limited international linkages compared to regional peers like Singapore and Bangkok.

- *Root Causes*

✓ Institutional fragmentation and limited information-sharing among stakeholders.
✓ SMEs often do not consider R&D and collaboration with universities a strategic priority.
✓ Financial resources for innovation remain insufficient, with R&D expenditure as a share of GDP relatively low.
✓ Absence of long-term, stable policies to sustain collaboration beyond budget cycles.

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## IV. POLICY SOLUTIONS TO STRENGTHEN TRIPLE HELIX COLLABORATION IN HCMC IN THE DIGITAL ERA

Drawing on the analysis of current conditions and international best practices, HCMC should implement an integrated framework built on four strategic pillars for 2025–2030:

➢ *Establishing a Central Orchestrator*

A city-level or regional **Innovation Council** should be created, with formal representation from universities/research institutes, enterprises, and government.

- *Its Functions Would Include:*

✓ Designing long-term innovation strategies aligned with the city's priority sectors (ICT, smart logistics, biotechnology, fintech).
✓ Coordinating tri-partite R&D programs with transparent risk- and benefit-sharing mechanisms.
✓ Serving as the main body for resource allocation, minimizing duplication and fragmentation.

➢ *Reforming financial mechanisms and policy support*

Lessons from Israel's Yozma program and Germany's Fraunhofer model demonstrate the importance of hybrid public–private financial systems.

- *Accordingly, HCMC should:*

✓ Establish a public–private venture fund with government seed capital to attract private co-investment.
✓ Offer tax deductions for enterprises that invest in R&D and collaborate with universities/research institutes.
✓ Introduce outcome-based R&D contracts to enhance accountability and efficiency in research projects.

➢ *Developing Innovation Infrastructure and Shared Spaces*

Global cases such as Kendall Square (USA) and one-north (Singapore) show that physical infrastructure underpins innovation ecosystems. HCMC should:

- Accelerate the development of Thu Duc Innovation District as a hub integrating universities, enterprises, startups, labs, and investors.
- Build corporate labs and joint public–private research centers in strategic sectors, funded by multiple stakeholders and with shared access to infrastructure.
- Invest in open data platforms to facilitate knowledge exchange and digital innovation.

➢ *Improving Legal Frameworks, KPIs, and International Linkages*

- Enact clear IPR and benefit-sharing frameworks to shorten negotiation times and incentivize enterprise participation.
- Develop a standardized KPI system for Triple Helix programs, covering patents, spin-offs, commercialized products, and research-derived revenue.
- Expand international linkages with leading innovation hubs in the region (Singapore, Thailand, South Korea) to enhance global competitiveness.

## V. CONCLUSION

In the digital era and the Fourth Industrial Revolution, the Triple Helix model is crucial in building an effective innovation ecosystem. The case of Ho Chi Minh City shows that despite strong infrastructure, human resources, and initial policy frameworks, Triple Helix collaboration remains limited due to governance gaps, fragmented financing, underdeveloped legal frameworks, and lack of institutionalized cooperation.

This study proposes four strategic solution pillars: (1) establishing a central orchestrator, (2) reforming financial mechanisms and policies, (3) developing innovation infrastructure and shared spaces, and (4) improving legal frameworks, KPIs, and international linkages. If implemented in a synchronized manner, these solutions could transform HCMC into a dynamic Triple Helix ecosystem, enhancing commercialization, fostering entrepreneurship, and strengthening international competitiveness.

Academically, the research contributes to extending Triple Helix theory into the context of emerging metropolitan economies in Southeast Asia. Practically, it provides concrete policy recommendations for HCMC for 2025–2030, positioning the city as a leading regional innovation hub.

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