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Research on the Construction Path of Chongqing's University-Anchor Innovation and Entrepreneurship Ecosystem from the Perspective of Science-Education Integration

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Abstract: The university-anchored innovation and entrepreneurship ecosystem serves as both a spatial carrier and an institutional innovation that promotes science-education integration and facilitates the commercialization of scientific and technological achievements. Based on the innovation ecosystem theory and the triple helix theory, this article constructs a four-dimensional analysis framework from the perspective of science and education integration - "disciplinary collaboration, resource integration, talent connection, and achievement commercialization," and conducts a systematic investigation of the innovation and entrepreneurship ecosystem anchored by ten universities in Chongqing. The study found that Chongqing's ecosystem construction has evolved from space carrier development to innovative ecosystem cultivation, forming a local practice model of "university-local government collaboration, full-chain empowerment, and precise peer-based incubation." However, there are still obvious bottlenecks in terms of the depth of disciplinary collaboration, the efficiency of resource integration, the talent connection mechanism, and the effectiveness of commercialization of results. This article proposes that Chongqing should transition from the "factor aggregation" stage to the "ecological symbiosis" stage. By optimizing top-level design, improving platform construction, strengthening technological empowerment, and improving the service ecosystem, a university-anchored innovation and entrepreneurship ecosystem construction plan with Chongqing characteristics can be formulated to provide replicable and scalable experience for similar cities.

Keywords: Integration of science and education; Innovation and entrepreneurship ecosystem with universities as the core; Triple helix theory; Commercialization of results; Chongqing

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1. Statement of the Problem

The integration of science and education is a strategic proposition to promote in-depth collaboration between

technological innovation and educational development in the new era. The 20th National Congress of the Communist Party of China clearly proposed "coordinating the collaborative innovation of vocational education, higher education, and continuing education, and promoting the integration of general education and vocational education, the integration of industry and education, and the integration of science and education", elevating the integration of science and education to the core path of the national innovation system. As a spatial innovation carrier that relies on university science and education resources and meets regional industrial needs, the innovation and entrepreneurship ecosystem anchored by universities has naturally become a "testing ground" and "display window" for the integration of science and education.

Since the launch of its university-anchored innovation and entrepreneurship ecosystem construction in 2019, Chongqing has established ten such ecosystems, cumulatively accommodating 2, 887 innovation teams and nurturing 5, 347 enterprises, among which 3, 206 are technology-based enterprises and 412 are high-tech enterprises. However, the ecosystem construction still faces structural dilemmas characterized by "platforms but limited synergy, resources but limited commercialization, and spaces but limited ecology." A critical theoretical and practical issue to be addressed is how to transform the scientific and educational resource advantages of universities into tangible drivers of regional innovation development from the perspective of science-education integration.

2. Theoretical foundations and analytical framework

2.1. Theoretical perspective: The coupling logic of science-education integration and innovation ecosystems

The essence of the integration of science and education is to break the institutional boundaries between scientific research and talent training and achieve the organic unity of knowledge production, technology transfer and human capital development. The innovation and entrepreneurship ecosystem anchored by universities has become an ideal carrier for the integration of science and education due to its triple spatial superposition effect: geographical proximity to universities helps to obtain cutting-edge knowledge spillovers; establishing institutions on platforms such as university science parks and proof-of-concept centers to provide institutional innovation for the commercialization of results; and connecting different stakeholders, including governments, universities, enterprises and capital, to form a collaborative governance network.

Innovation ecosystem theory emphasizes actor diversity, resource complementarity and evolutionary self-organization, while triple helix theory reveals the co-evolutionary mechanism among the triadic interactions of university-industry-government. Integrating these two theoretical frameworks provides a systematic "structural-functional evolution" explanatory framework for the university-anchored innovation and entrepreneurship ecosystem.

2.2. Construction of the "four-dimensional integrated" analytical framework

Based on the intrinsic requirements of science-education integration and the key issues in ecosystem construction, this paper constructs a four-dimensional analytical framework: "subject synergy—resource integration—talent connectivity—achievement commercialization."

(1) Subject synergy focuses on the functional positioning and interaction mechanisms among multiple stakeholders—including government, universities, enterprises, and incubators—within the ecosystem,

with the core being the institutional design and benefit linkage of "university-local government synergy."

(2) Resource integration emphasizes the sharing and interfacing between scientific and educational resources (research platforms, instruments and equipment, data resources) and industrial resources (capital, markets, supply chains), with the core being mechanism designs such as the opening of research platforms to enterprises and cross-regional circulation of innovation vouchers.

(3) Talent connectivity emphasizes the integration of innovation and entrepreneurship talent cultivation with science-education collaborative education mechanisms, with the core being the connectivity between professional education and innovation-entrepreneurship education, as well as the integration of graduate student training with research projects.

(4) Achievement commercialization emphasizes the whole-chain support system from laboratory to market, with the core being the institutionalized arrangements for commercialization links such as proof of concept, pilot-scale validation, and investment and financing.

3. Practical investigation of Chongqing's University-anchor innovation and entrepreneurship ecosystems

3.1. Development status: From "point breakthroughs" to "comprehensive expansion"

Chongqing's ecosystem construction has undergone two developmental stages. The first stage (2019–2023) focused primarily on spatial carrier development, relying on the renovation of old factory buildings and structures around universities to build an incubation chain of "maker spaces + incubators + accelerators + industrial parks." The second stage (2024 to present) has been dedicated to building an "upgraded version, " emphasizing the construction of an ecosystem that integrates innovation and entrepreneurship, achievement commercialization, technology services, alumni economy, and innovation atmosphere in a "five-in-one" framework.

The ecosystem surrounding Chongqing University of Arts and Sciences has pioneered a "four-dimensional integration" model. Through the integration of professional education and innovation-entrepreneurship education, it has established a curriculum system of "foundational enlightenment—knowledge and skills—practical training—achievement incubation." Through science-education connectivity, it has guided more than ten research platforms to open "technology service Taobao stores" within the ecosystem, collectively receiving over 20 million yuan in innovation vouchers and serving more than 600 enterprises. In 2020, it took the lead in establishing the Chengdu-Chongqing Economic Circle Innovation and Entrepreneurship Alliance, bringing together over 30 universities and more than 20 local governments from the two regions to build a cross-regional collaborative network.

The ecosystem surrounding Chongqing University has focused on the proof-of-concept stage, co-establishing a proof-of-concept center with the Shapingba District Government, pioneering a "university-local government collaborative valley-breaking" model. In 2024, the government injected 2 million yuan to launch the first batch of proof-of-concept projects; all six projects have registered commercialization companies, with intellectual property valued at 16.9 million yuan and cumulative valuations reaching 70 million yuan.

The ecosystem surrounding Chongqing University of Technology has built a "five-chain integration" system: establishing a 10-million-yuan seed fund for entrepreneurship and, in collaboration with social capital, forming an 850-million-yuan venture capital fund—making it the only university in the city equipped with a venture capital fund; constructing 53 provincial and ministerial-level research platforms, forming

a “gradient incubation chain” from entrepreneurial nursery to industrial park; and achieving a cumulative achievement commercialization value of 760 million yuan in recent years.

The ecosystem surrounding Southwest University has established a commercialization chain of “maker space + incubator + accelerator, “ spinning off more than 2, 500 research achievements, achieving a 200% increase in technology contract transaction value, and cumulatively incubating nearly 1, 000 innovation entities.

3.2. Prominent problems: The gap from “factor agglomeration” to “ecological symbiosis”

(1) Subject synergy remains superficial. Collaboration between districts/counties and universities largely stays at the level of spatial supply and project application, lacking deep synergy mechanisms for benefit sharing and risk sharing. At the January 2026 coordination meeting, universities intensively reported issues concerning key project support, carrier space guarantees, and statistical system optimization, reflecting that the “last mile” of university-local government synergy has yet to be bridged.

(2) Institutional barriers obstruct resource integration. The openness of university large-scale instruments and equipment, research data, and laboratory resources to enterprises remains limited, and the “technology service Taobao store” model of research platforms has not yet been scaled up. Standardized systems for cross-regional use of innovation vouchers and sharing of research facilities remain underdeveloped.

(3) Talent connectivity suffers from a gap between learning and application. Innovation and entrepreneurship education still exists primarily in the form of “second classroom” activities, with insufficient deep integration into professional education. Science-education collaborative talent cultivation remains largely at the level of joint graduate student training, with institutional channels for undergraduate participation in research projects not yet smooth.

(4) Achievement commercialization faces deep valleys. The commercialization rate of university research achievements remains below 30%, and key commercialization links such as proof-of-concept centers and pilot-scale platforms have limited coverage. Insufficient funding for early-stage projects makes the “valley of death” phenomenon still prominent.

4. Case comparisons and experience references

4.1. International experience: Stanford and Silicon Valley, Cambridge Science Park

The symbiotic relationship between Stanford University and Silicon Valley serves as a model example, with core mechanisms including: encouraging faculty entrepreneurship and academic leave systems, the professional operation of the Office of Technology Licensing (OTL), and the reinvestment of alumni network venture capital. Cambridge Science Park, relying on the property operations of Trinity College, Cambridge, achieves value capture from knowledge spillovers through mechanisms such as land leasing and equity participation. The common revelation from both is that institutional openness of universities and professionalized technology transfer services are prerequisites for ecosystem prosperity.

4.2. Domestic comparison: Shanghai “Zero Bay” and Hangzhou West Lake District

Shanghai’s “Zero Bay” was jointly created by the Municipal Science and Technology Commission, Minhang District and Shanghai Jiao Tong University. It follows a three-step plan of “core area - expansion area -

radiation area" and aims to become a world-class university-anchored innovation zone by 2035. Its main experience includes: high-level government promotion of top-level design, full-chain spatial functional layout of Jianchuan Road, and systematic construction of a venture capital ecosystem.

The Hangzhou West Lake District ecosystem revolves around Zhejiang University, with the "Zhejiang University Yuquan Artificial Intelligence Innovation Valley" as the center, providing free office space for teachers and students of Zhejiang University, focusing on achieving differentiated positioning in the field of artificial intelligence. Its main experience includes: closely integrating with a single dominant discipline, providing a "zero-cost entrepreneurial" space, and creating a vertical industry ecosystem.

4.3. Enlightenment: Chongqing's differentiated positioning and path selection

Comparative analysis shows that Chongqing's ecosystem construction should not simply copy Shanghai's "zero bay" model—the latter relies on the capital agglomeration effect of top research universities and first-tier cities. Chongqing should be based on its status as the manufacturing center of the western region and the core city of the Chengdu-Chongqing Economic Circle, and take a differentiated path of "science and education resources empowering industrial upgrading": closely connect with the "33618" modern manufacturing cluster system, embed ecosystem construction into advantageous industries such as intelligent manufacturing, new energy vehicles, biomedicine, and form a closed loop of "industrial demand-driven - science and education resource supply - ecological bearing commercialization"

5. Path optimization of Chongqing's ecosystem construction from the perspective of science and education integration

5.1. Optimize top-level design: From "project-driven" to "system governance"

The key to solving the problem of superficial collaboration between universities and local governments lies in institutionalized and legalized collaborative governance. It is recommended to promote the promulgation of the "Chongqing Universities Anchor Innovation and Entrepreneurship Ecosystem Construction Regulations" to clarify the rights, responsibilities and benefit distribution mechanisms of the government, universities and enterprises in the construction of the ecosystem. The "Chengdu-Chongqing Economic Circle Innovation and Entrepreneurship Alliance" model pioneered by the ecosystem surrounding Chongqing University of Arts and Sciences should be scaled up, and ecosystem construction should be incorporated into the performance evaluation systems of district/county governments and universities. The January 2026 coordination meeting's proposal to "establish smooth linkage mechanisms between districts and universities, and promote task implementation through list-based and item-based approaches" should be further elevated into institutional arrangements.

5.2. Improving platform construction: From "physical space" to "functional ecology"

Having largely completed spatial carrier development, the next stage of ecosystem construction should focus on "functional filling" and "service upgrading." Three types of functional platforms should be prioritized:

(1) Proof-of-concept platforms: Scale up the "university-local government co-established proof-of-concept center" model pioneered by the ecosystem surrounding Chongqing University, establishing specialized proof-of-concept centers in each ecosystem with a three-tier screening mechanism of "pre-patent-application evaluation, proof-of-concept training camp, integration of grant and investment funding

pool."

(2) Pilot-scale validation platforms: Drawing on the "five-chain integration" experience of Chongqing University of Technology, build open pilot-scale bases around advantageous industries to reduce the pilot-scale costs for small and medium-sized enterprises.

(3) Digital service platforms: Develop a "rapid achievement transfer" digital application system to enable intelligent matching of technology supply and demand and full-chain tracking of the commercialization process.

5.3. Strengthening technology empowerment: From "experience-driven" to "data-driven"

It is recommended to leverage Chongqing's advantages in the digital economy to build a data governance system for ecosystem construction. Specific measures include: establishing a dynamic monitoring platform for ecosystem construction to conduct real-time monitoring and early warning of core indicators such as innovation team occupancy rate, achievement commercialization rate, and enterprise survival rate; employing big data technology to map industrial technology landscapes and university research capability profiles, enabling precise matching of "technology demand—research supply"; and drawing on the experience of the ecosystem surrounding Chongqing University of Arts and Sciences in co-establishing the "Chengdu-Chongqing Cloud-based Dual Innovation Research Institute" with China Unicom High-tech Big Data Company to promote the digital upgrading of incubation services.

5.4. Refining the service ecosystem: From "fragmented supply" to "whole-chain empowerment"

Crossing the "valley of death" in achievement commercialization requires the systematic integration of whole-chain services. It is recommended to build a full-chain service system of "entrepreneurial nursery—proof of concept—pilot-scale validation—industrialization, " equipping each link with specialized service teams and financial instruments. Drawing on the "full-process companion-style incubation" experience of the ecosystem surrounding Southwest University, cultivate a professionalized technology manager team and establish a commercialization team model of "scientist + engineer + technology manager." On the funding side, promote a multi-tiered funding supply system of "government guidance + university seed funds + social venture capital, " implementing the policy orientation of "investing early, investing small, and investing in hard technology."

6. Conclusion

The construction of Chongqing's university-anchored innovation and entrepreneurship ecosystems has passed through the initial "from scratch" phase and is entering the critical "from existence to excellence" phase. This study demonstrates that from the perspective of science-education integration, the core proposition of ecosystem construction is not simply spatial expansion or project accumulation, but rather the construction of a "subject synergy, resource integration, talent connectivity, and achievement commercialization" four-in-one innovation ecosystem. Chongqing's practical exploration indicates that university-anchored innovation and entrepreneurship ecosystems have the potential to become effective carriers for overcoming the "valley of death" in the commercialization of scientific and technological achievements. However, the full release of their effectiveness depends on transitioning from the physical reaction of "factor agglomeration" to the

chemical reaction of "ecological symbiosis." Only by achieving systemic breakthroughs in institutional design, platform functions, technology empowerment, and service ecosystems can a "Chongqing Plan" with distinctive local characteristics and replicable value be formed, providing useful references for similar cities.

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