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A STUDY ON CONSTRUCTION OF FUTURE INDUSTRY INNOVATION ECOLOGY AND POLICY SUPPORT SYSTEM IN SUZHOU, CHINA

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Abstract:

With the transformation of global information technology and economic structure, the development of future industries are the key to the transformation of urban economy. This paper aims to explore and construct the innovation and support strategy framework of future industries in Suzhou, China to promote the sustainable development and technological innovation. According to the industrial status, development potential and future industrial trends of Suzhou, , this paper identifies the influencing factors suitable for the key areas of future industrial development in Suzhou and proposes support strategies for optimizing innovation (innovation ecological strategy framework) based on the multi-criteria decision-making (MCDM) theory. Therefore, this study is conducive to the optimization of industrial structure, the promotion of scientific and technological innovation and economic development.

Keywords:

Future Industries, Innovation Ecosystem, Support Strategies, Identification Of Key Areas

Introduction

As an important manufacturing base in the Yangtze River Delta region, Suzhou, China, has formed a diversified industrial structure dominated by electronic information, high-end

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equipment manufacturing, biomedicine and new materials after decades of industrial accumulation and upgrading (Xie et al., 2021). *Suzhou Future Industry Scenarios Innovation Three-Year Action Plan (2024-2026)* has opened more than 1,500 kilometers of intelligent connected vehicle test roads. With its superior location and perfect transportation network, Suzhou has not only taken over a large number of international advanced manufacturing transfers, but also actively promoted local enterprises to extend to the middle and high end of the industrial chain (Liu et al., 2021). Thus, driven by sustainable development and the digital economy, Suzhou has strong development potential. On the one hand, by deepening industrial collaboration with surrounding cities such as Shanghai and Wuxi, industrial technological innovation is strengthened (Li et al., 2023). On the other hand, with the accelerated application of artificial intelligence and green and low-carbon technologies, Suzhou's future industrial infrastructure will form an emerging industrial ecosystem with global competitiveness.

Talent resources and market environment have become key supports for Suzhou's future industrial development. From the perspective of the market environment, Suzhou's private economy is vibrant (private enterprises account for more than 90%), and the scale of foreign investment utilization has ranked first in Jiangsu for ten consecutive years [Lin, 2022]. In terms of talent resources, Suzhou has attracted and cultivated more than 40,000 high-level talents, and has co-built innovation institutes with universities such as Nanjing University and the University of Science and Technology of China, forming a talent supply model of "*industry-education integration*" [Gong, 2024]. The industry-university-research platform jointly built by universities, research institutes and enterprises has jointly improved the availability of technology, talents and funds. The ability to obtain resources determines whether innovation factors can be gathered in a timely manner (Battisti et al., 2022). Indicators such as patent output rate, technology transfer rate and project incubation success rate can directly reflect the matching degree between R&D investment and economic value (Svensson, 2022). In addition, cross-industry cooperation and public service platforms have achieved resource sharing, information sharing and win-win benefits, thus forming a virtuous cycle of technological innovation and market development (Di et al., 2024). Hence, Suzhou actively creates an open market environment. The synergy of these factors will help Suzhou build a future industrial innovation ecology and policy support system.

This paper focuses on building a framework for innovative industry development and support strategies to systematically empower Suzhou's future industrial upgrading. The study takes "key industry influencing factors" as the core logic, integrates the current status, development potential and future industry trends of different industries, and focuses on breakthroughs in three dimensions: (1) Based on literature analysis, we identify the influencing factors in key areas of Suzhou's future industries; (2) Combined with key industry influencing factors, we build a collaborative innovative industry development and support strategy framework (IDSSF) to achieve dynamic matching of industry-university-research resources and innovation efficiency monitoring; (3) Based on expert interviews, we verify the innovative industry development and support strategy framework to provide a paradigm reference for the construction of the future industrial ecosystem in the Yangtze River Delta.

Literature Review

Future industrial innovation ecology has gradually shifted from static factor analysis to dynamic system construction. [9] show that "Innovation Ecosystem 4.0" theory reveals the closed-loop driving effect of data factors on technology research and development, scenario

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verification and commercial diffusion, especially the "Ecosystem Resilience Index (ERI)". However, they rarely combine the actual industrial structure and innovation ecological characteristics of a specific region (such as Suzhou), and it is difficult to fully reflect the interaction mechanism and coordination strategy among multiple subjects in emerging industrial clusters. At the same time, the regional innovation system theory further emphasizes that the completeness of infrastructure and information network connectivity in innovative clusters have a significant impact on the diffusion of emerging industries (Yin et al., 2022). Shi et al. (2022) think that the secondary indicators such as high-end talent supply, capital factor allocation and policy orientation are refined using bibliometrics and hierarchical analysis, providing a mature indicator system for subsequent quantitative evaluation. In addition, the collaborative efficiency of government, enterprises and universities can be improved by more than 40% with the support of digital technology. Suzhou's innovation practice further refines the theory through the "chain leader enterprise + common technology platform" model(Wang et al., 2025). However, the platform has not yet been put into use on a large scale. Therefore, the relevant platforms of innovation and strategy have a role in the actual industrial development.

In the study of innovation ecosystems, resource acquisition capability is established as a core intermediary dimension, which originates from resource-based economics (RBE) and dynamic capability theory. The efficient mobilization of technological assets, talent factors and funding channels by regions or enterprises is the basis for sustainable competitive advantage and ecological resilience (Wang et al., 2023). Input-output efficiency quantifies factors such as R&D investment, platform construction and talent training with patent output, technology incubation and market value conversion efficiency (Wang et al., 2021). Synergy and complementarity draw on the theory of complementary assets, emphasizing the deep integration of multiple subjects such as government, scientific research institutions, enterprises and capital in the technology-market-capital chain (Feldman et al., 2022). In addition, policy support, as an institutional lever, not only reduces innovation risks through tools such as fiscal incentives, tax incentives and regulatory sandboxes, but also catalyzes resource allocation and market demand through regulations and public procurement (Nemlioglu & Mallick, 2021). Therefore, in terms of industrial foundation and market environment, innovation capabilities and excellent talents play an important role (Table 1).

Table 1 Crucial Factors In Innovation Industry

Crucial factors	Second factors	Details	Theory	References
Technological Innovation Capability	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Decision on technology, talent, finance, equipment	Resource base view	[13]
Industrial Infrastructure	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Reflected transformation of elements	Innovation systems assessment	[14]
Talent Resources	Resource acquisition Inputs and outputs Synergy and Complementarity	Higher education resources	Complementary assets	[15]

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	Policy Support			
Market environment	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Political incentives, tax benefits	Theory of policy instruments	[16]

Methodology

MDCM (Multi-Criteria Decision Making) is a systematic decision-making method used to evaluate and select the best solution under multiple conflicting criteria. Analytic Hierarchy Process (AHP) is the widely used specific method under the MCDM framework. AHP not only solves the problem of weight allocation between criteria in multi-criteria and multi-level decision-making, but also provides an operational mathematical tool for MDCM, so that complex decision-making problems can be systematically optimized and innovative industries and strategic needs.

Step 1: To Construct A Hierarchical Model.

IDSSF of future industry collaboration in Suzhou ensures the systematic and logical nature of the decision-making structure. This study first constructs a top-down hierarchical model: "Optimizing the future industrial development strategy" is set as the decision-making target layer, and the criterion layer is set up, including four key first-level indicators - technological innovation capability, industrial infrastructure, talent resources and market environment; each criterion is further refined into a second-level sub-criterion layer (resource acquisition capability, input and output, synergy and complementarity and policy support) to enhance the pertinence and evaluability of the indicators. This structure clearly shows the hierarchical relationship between decision-making goals and various influencing factors, laying the foundation for subsequent weight calculation and priority sorting.

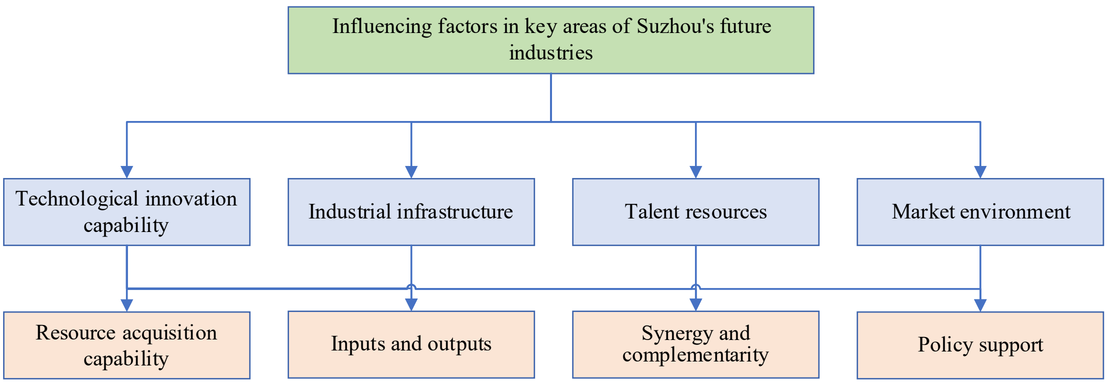

Figure 1 Hierarchical Model For Suzhou's Future Industries

Step 2: To Construct A Judgment Matrix.

Using the 1-5 scale (Table 2), measure the variations in significance by means of relative scales by experts and create a judgment matrix that fulfills in 2025. Of the three professionals, more than five years of innovation sector experience in China (Table 3). For instance, in the Suzhou policy assessment, if technological innovation capacity is somewhat more significant than industrial infrastructure (scale 3) and complete the symmetric components following

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reciprocity. Local pairwise comparison helps to simplify subjective assessment using this approach.

Table 2 Relative Importance Scale (1–5)

Scale	Verbal Description	Explanation
1	Equal importance	Two criteria contribute equally
2	Slightly more important	i is marginally more important than j
3	Moderately more important	i is moderately more important than j
4	Strongly more important	i is strongly more important than j
5	Extremely strongly more important	i is extremely more important than j

Table 3 Expert Panel Profile

Expert ID	Title	Years	Main Expertise
E1	Manager	5	Strategic planning for emerging industries
E2	Professor	7	Technology R&D Management
E3	R&D Director	5	Innovation ecosystem assessment

Step 3: To Calculate The Relative Weight Vector.

The maximum eigenvalue (λ_{max}) of the matrix and its corresponding eigenvector, and then normalize the eigenvector (component divided by the vector sum) in Equation (1) to obtain the weight vector that satisfies the normalization. On the basis of constructing the judgment matrix, in order to obtain the relative importance of each factor at the same level, it is necessary to calculate the judgment matrix λmax and its corresponding eigenvector $W=[W_1, W_2, \dots, W_n]^T$。

$$V_j = \frac{W_i}{\sum_1^n W_j} \quad (1)$$

Step 4: Consistency verification.

Consistency verification is a key step in judging the logical rationality of the matrix. Its core goal is to ensure that the subjective judgment of experts conforms to the transitivity rule. The consistency index (Equation (2)) is calculated based on the maximum eigenvalue (λ_{max}) of the judgment matrix. Then, the consistency ratio (Equation (3)) is calculated in combination with the random consistency index (*RI*, Table 4). If $CR<0.1$, the matrix logic is considered to be self-consistent and the weight result is credible; if $CR\geq0.1$, the scale value in the judgment matrix needs to be adjusted (correct the contradictory comparison relationship or recalibrate the expert score) to eliminate significant logical conflicts, thereby ensuring the scientific nature of subsequent weight synthesis and decision-making conclusions.

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (2)$$

$$CR = \frac{CI}{RI} \quad (3)$$

Table 4 Average Consistency Indicator

n	1	2	3	4	5
RI	0	0	0.52	0.89	1.12

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Results

In Suzhou's forthcoming industrial collaborative innovation and support strategy, technological innovation capability is paramount, assigned the highest weight of 0.457, signifying that ongoing breakthroughs and efficient transformations of core technologies are the principal catalysts for the advancement of emerging industries. Industrial infrastructure (0.204) and talent resources (0.127) follow closely, indicating that a comprehensive intelligent manufacturing platform, a robust digital support system, and the availability of high-caliber R&D and management personnel are essential for the implementation and expansion of new industries. Although capital and market environment are ranked lowest at 0.105, they still hold significant importance, underscoring the necessity of optimizing the investment and financing structure. Unblocking market demand is an essential requirement for ensuring the healthy functioning of the industrial environment.

Conversely, the capability for resource acquisition (2.135) possesses the highest weight, signifying Suzhou's comparative advantages in procuring essential elements such as R&D funding, platform resources, talent, and equipment. The efficiency of input and output (0.930) closely follows, highlighting the significant influence of the alignment between R&D input and patent output, infrastructure development, operational efficiency, talent cultivation, and achievement transformation on the ecosystem's vitality. Although the weights for synergy and complementarity (0.481) and policy support (0.105) are somewhat lower, they serve as the institutional and network foundation for bolstering the system's resilience and evolutionary capabilities, underscoring the profound integration of government, enterprises, research institutions, capital, and other entities in information sharing and collaborative project development, as well as the targeted support of fiscal and tax incentives for innovation factors.

Consequently, Suzhou still has some shortcomings in the efficiency indicators of R&D patent output rate, and it is necessary to optimize resource allocation through innovation for Suzhou's future industrial growth. We should focus on strengthening technological innovation, improve industrial infrastructure and talent introduction and cultivation methods, and continue to optimize the capital and market environment to form a closed loop of "technology-industry-talent- environment" coordinated promotion. Meanwhile, the dynamic monitoring and feedback system needs to be combined with sensitivity analysis to test the key weights to ensure that the strategy is ranked robustly under different scenarios, so as to achieve high-quality transformation from industry-driven in Suzhou. In addition, this work also has some limitations. The size and composition of the expert sample are relatively limited, and only three experts with many years of business and policy experience are selected. Even though their judgments are based on facts, they will always have personal opinions that affect how the judgment matrix is filled out and how weights are assigned. AHP itself is a static weight analysis method, which is difficult to fully capture the evolution and path of innovation factors in different times or between different projects.

Strategies and IDSSF

Figure 2 shows the three main components of the IDSSF that this article aims to build: policy design, platform construction, and ecological synergy. These components are crucial for understanding the elements that will shape Suzhou's industrial development in the future. To begin, we will strengthen the capacity to acquire resources and the framework for investing varied money by creating dedicated innovation funds and directing venture capital. Secondly, we utilize intelligent technology to construct an intelligent management platform that spans the

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whole life cycle. This platform allows us to optimize R&D investment, patent output, project progress, market feedback, and real-time monitoring, ultimately leading to a significant increase in output efficiency. Collaboration between businesses, universities, and researchers not only improves synergistic and complementary impacts, but also encourages the co-construction of industries through deep integration across factors and subjects. Finally, we will launch performance evaluation and dynamic adjustment mechanisms based on platform data to speed up the process of responding to policy support and improve differentiated fiscal subsidies, tax incentives, and rapid review of intellectual property rights.

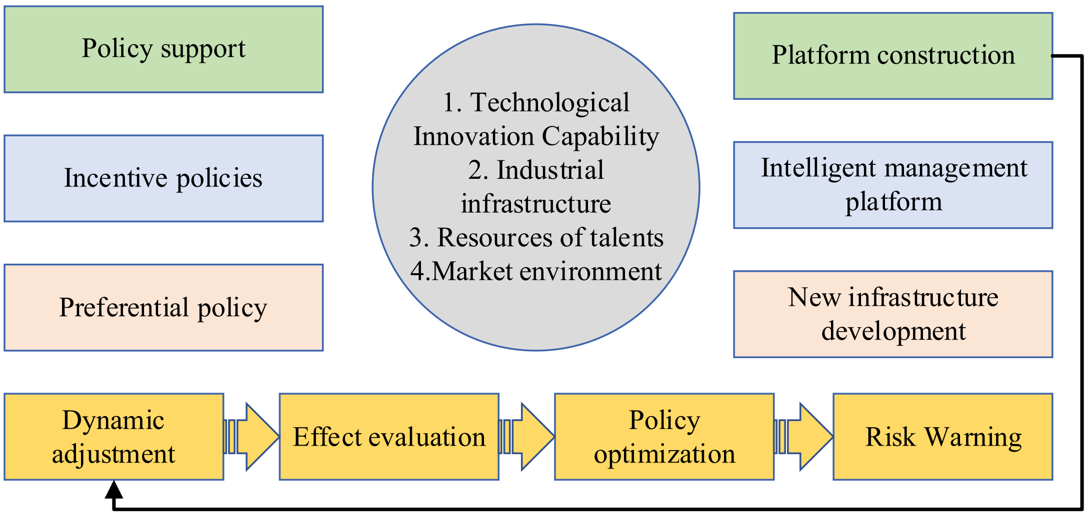

Figure 2 Innovative Industry Development and Support Strategy Framework

On the other hand, with regard to the capabilities of technological innovation, we propose that significant scientific and technological projects with the purpose of accelerating the creation of open innovation platforms and technology transfer hubs should be implemented. On the other hand, with regard to the infrastructure of the industrial sector, we propose that the development of digital parks and smart factories should be sped up, and that the promotion of 5G+ industrial Internet, digital twins, and cloud manufacturing services should be encouraged. While this is going on, the "industry-university-research" joint training mechanism ought to be enhanced, and a two-way incentive policy ought to be developed for the purpose of attracting high-end talents and retaining local skills. Both of these goals are related to the availability of talent resources. In terms of the market environment, we propose that the financial service system should be optimized, market access and procurement processes should be simplified, and domestic and foreign e-commerce and supply chain platforms should be expanded. These recommendations are intended to construct a development ecosystem that is of high quality and possesses both innovative vitality and industrial competitiveness.

This study engaged three senior industry experts (Table 3) to perform semi-structured in-depth interviews to assess the feasibility and practicality of IDSSF across the dimensions of policy, industry, and operation. The experts unanimously confirmed the efficacy of innovation in addressing the financial challenges faced by start-ups and stressed that policy support requires further refinement. Simultaneously, experts recommended incorporating market demand forecasts and danger warning modules into the platform. Experts emphasized the necessity of integrating standardized processes and hierarchical authority management inside collaborative frameworks to prevent redundant resource allocation and information silos. Furthermore, they recommended that the policy support subsystem incorporate varied incentives and dynamic adjustments, and advised that platform operational data be integrated into the ongoing assessment indicator system for fiscal subsidies and tax incentives. In response to this feedback, the paper enhanced the IDSSF framework in three areas: first, the linkage mechanism was refined; second, the data analysis and risk warning capabilities of the intelligent platform were broadened; third, the process nodes and feedback loops of collaborative governance were optimized to ensure the framework's efficacy.

Conclusions

This paper methodically undertook three basic activities centered on the research objective of identifying the important influencing variables of Suzhou's future industrial development. (1) Utilizing the Analytic Hierarchy Process (AHP), this study identified and prioritized four primary factors: technological innovation capability, industrial infrastructure, talent resources, and capital and market environment, alongside four secondary factors: resource acquisition capability, input-output efficiency, synergy and complementarity, and policy support; (2) Leveraging a collaborative platform, this research developed a Collaborative Innovation Industry Development and Support Strategic Framework (IDSSF) that amalgamates policy design, platform construction, and ecological collaboration, while delineating essential modules such as an intelligent management platform and a multi-party collaborative mechanism; (3) Through comprehensive interviews with three categories of experts from governmental and corporate sectors, the framework's feasibility was validated and enhanced, focusing on improving the connection between funding and performance, augmenting the platform's risk warning capabilities, and refining the collaborative process nodes. The study indicates that technological innovation capability and resource acquisition capability are pivotal in advancing the development of emerging industries in Suzhou. It underscores the essential role of core technology research and factor aggregation in establishing a robust industrial ecology. Furthermore, the enhancement of industrial infrastructure and input-output efficiency is crucial for the effective realization of innovative outcomes. While talent resources, synergy and complementarity, and policy support are comparatively less significant, they form the institutional and organizational foundation necessary for the ongoing evolution and virtuous cycle of the ecosystem, thereby offering vital support for sustaining regional competitive advantages.

On the other hand aspect, future study may be further explored in the following areas. Future research will incorporate system dynamics (SD) and agent-based simulation technologies to model the dynamic evolution of the IDSSF operating mechanism, thereby elucidating path dependence and nonlinear feedback among factors. Additionally, it will integrate big data and artificial intelligence to develop predictive and optimization algorithms grounded in machine learning, facilitating real-time responses and precise adjustments to R&D investment, patent output, and fluctuations in market demand. Furthermore, it will expand cross-regional multi-case comparative studies to encompass additional cities within the Yangtze River Delta and potentially a broader economic belt, assessing the framework's applicability and generalizability across diverse industrial structures and policy environments.

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Declaration Of Competing Interest
The results of this study are not affected by any financial or interpersonal issues.

Data Availability
The article contains the data that underpins the study's results.

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