



# The Evolution and Enlightenment of Shanghai Science and Technology Innovation Policy from the Perspective of Advocacy Coalition Framework

---Based on 122 Policy Text Analysis from 1992 to 2022

Jingzi Wang <sup>1</sup>

<sup>1</sup> Shanghai Jiaotong University, No.1954 Huashan Road, Shanghai 200030, China  
cecilawang@sjtu.edu.cn

**Abstract.** From the perspective of Advocacy Coalition Framework (ACF), the study conceptualizes “external intervention - policy orientation learning” framework on the evolution of Shanghai Science and Technology Innovation (STI) policies under the background of national technology strategy. Based on textual analysis of 122 copies of Shanghai’s STI policy texts from 1992 to 2022, the major findings include: (1) The evolution of STI policies is driven by the change of core beliefs and instrumental beliefs among the coalitions: government, intermediaries and enterprises; (2) The evolution experienced three stages: cultivation, growth, and mature stage. Their respective beliefs are influenced by external events, domestic and international circumstances together with policy orientation learning. Besides, current policy deficiencies include motivation scarcity from demand side, lack of industry perspective and repeating similarities among surrounding cities. The study suggests that the advocacy coalitions should collaborate and provide industry-focused policies, strengthening connections among policy groups with higher-quality orientation under Yangtze River Delta Integration Strategy.

**Keywords:** Advocacy Coalition Framework, Science and Technology Innovation Policy, Policy Coalition, Policy Orientation Learning.

## 1 Introduction

In the current scientific and technological revolution, the advancement of science and technology is essential and provides a significant push for China's goal of achieving higher-quality growth. The Communist Party of China (CPC) 20th National Congress report highlights that "it is vital to improve the framework of S&T innovation, prioritize the central position of innovation in the overall proceedings of China's modernization, and speed up the implementation of innovation-driven strategy towards development".

Shanghai is an essential part of the strategy, served as a leader in reform and opening-up policies. It embarks on the historical mission of "transforming the mode of economic development" with the aim to build a global S&T innovation center. S&T

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policy plays an important role in resource allocation, as well as maintaining the regulation and instructions around innovation activities, as one of the measures the government undertakes to macro-control exertion.

The majority of current studies falls into two groups. One concentrates on the macro-level building of S&T innovation system. The researches focused on how to systematically build the S&T innovation system from the viewpoint of the life cycle of enterprises (e.g., Hongzu, 2014<sup>[1]</sup>; Xushu, 2022<sup>[2]</sup>; Xuyun, 2022<sup>[3]</sup>; Zhen, 2023<sup>[4]</sup>; Defang, 2022<sup>[5]</sup>), or from the perspective of the government's attention (Ye, 2023)<sup>[6]</sup>.

The other addresses at the meso- and micro-levels from multiple perspectives such as policy tools, objectives, evaluation, advancement, and etc. Junhua (2015)<sup>[7]</sup> investigated STI entrepreneurial carriers from the perspective of whole chain incubation; others (e.g., Lv, 2023<sup>[8]</sup>; Jinjing, 2023<sup>[9]</sup>; Wei, 2020<sup>[10]</sup>) studied how to optimize the policy mix. Besides, Jialing & Li (2016)<sup>[11]</sup> employed the B-Z model, Qiong & Junhua (2021)<sup>[12]</sup> selected the threshold's effect, Xiaoyue (2020)<sup>[13]</sup> utilized the QCA method, Yan (2019)<sup>[14]</sup> employed questionnaires, and Hui (2019)<sup>[15]</sup> adopted quantitative approaches to discuss the impact of policy support on enterprise innovation.

In addition, focusing on the evolution of S&T policy area, most of the scholars (e.g., Jiaojiao & Christina 2022<sup>[16]</sup>; Yuxiao 2021<sup>[17]</sup>; Yan 2020<sup>[18]</sup>; Xiang & Linsen, 2022<sup>[19]</sup>; Yu, 2023<sup>[20]</sup>) utilized the bibliometric and content analysis to sort out the policy evolution in the field of either central or local, or fiscal and financial or quality of S&T innovation.

Besides, overseas scholars not only focused on traditional areas such as policy continuity<sup>[21]</sup> and policy cycle<sup>[22]</sup>, but also encompassed political science, sociology, and other related disciplines. At the application level, overseas scholars pay more attention to the boundary between the public and private spheres<sup>[23]</sup>. This includes studying the impact of government R&D subsidies on private innovation<sup>[24]</sup> and analyzing typical case studies in policy implementation<sup>[25]</sup><sup>[26]</sup>.

Based on the aforementioned studies, it is evident that in China, while there have been studies on S&T policies using ACF theory in other areas like education<sup>[27]</sup> and pension security, there is a lack of research on the localization and innovation of the ACF theory specifically focused on the government's S&T innovation field.

The report of the 20th National Congress has elevated S&T innovation to a new level of national strategy. Based in Shanghai, the author's daily work is to serve local S&T enterprises and assist the government in fostering connections with these enterprises. Therefore, it is theoretically significant to analyze the changes and evolution of Shanghai's S&T innovation policy using an appropriate analytical framework.

The analysis will help identify any deficiencies as well. Meanwhile, it is more practical to focus on the future and optimize the STI policy system which will provide pioneership for other cities.

The core questions are raised as "What kind of evolution has Shanghai's S&T innovation policy experienced during the thirty-year period from 1992 to 2022?" "What are the driving forces behind these changes and the logical reasoning behind them?"

## 2 Rationale and Methodology

### 2.1 Advocacy Coalition Framework (ACF) Theory

It is the changes in various factors that primarily drive policy change. When these changes accumulate enough to alter instrumental beliefs and, consequently, core policy beliefs, the existing policies (both internal and external) will undergo a transformation. Thus, ACF theory recognizes that beliefs, which consist of shared knowledge and beliefs, are the driving force behind evolution. [28]

### 2.2 Theoretical Applicability of Shanghai's STI policy

#### The Category of Advocacy Coalitions

The study focuses on explaining the Advocacy Coalition Framework as actor-centered approach. Different actors with various identities work together to formulate effective policies.

The actors involved in Shanghai's STI policy include government, industrial parks and platforms, S&T intermediaries, research institutes and universities, S&T-based enterprises, research teams, and individuals. Under China's administrative system, different identities represent distinct interests and objectives. It is more difficult for the government and enterprises to share the same beliefs and be part of the same coalition, as proposed by Sabatier P. and Weible C. (2007) [29]. Therefore, the study categorize the actors into three advocacy coalitions: government, intermediary, and enterprise coalitions, in order to align with the Chinese context and based on their respective identities.

Intermediary coalitions involve various actors, such as economic development zones, incubators, highland laboratories, technology transformation, S&T intermediaries, financial institutions, innovation parks, and other platforms. The coalitions are responsible for undertaking and introducing various innovation projects in the dialogue between the government and enterprises, assuming functions such as policy interpretation, implementation, and evaluation.

The enterprise coalition includes a majority of science and technology-based enterprises, scientific research institutes, key colleges and universities, scientific research teams, and individuals. They are not only the entities engaged in STI activities, but also the primary recipients of STI policies. They are responsible for interpreting the impact of STI policies through market-oriented behaviors and providing feedback.

#### The Category of Belief Systems

The deep-rooted core belief shared by coalitions is the self-reliance and self-improvement of S&T and the construction of a global science and innovation center. This goal remains stable over long period.

The policy core beliefs and instrumental beliefs are different. "Providing a high-level open innovation ecological environment" is the core belief of the government coalition. The instrumental belief is to "optimize the allocation of resources and the integration of innovation, industry, funding and talent chain".

Apparently, the core belief of the intermediary coalition is to "enhance the S&T supply capacity and nurture the ecology of innovation enterprises ", while the instru-

mental belief is to "improve the cultivation of S&T enterprises, and provide technology market and financial support".

The policy core belief of the Intermediary Coalition is to "discover new fields including basic and applied research", while the instrumental belief is to "provide products and services with independent intellectual property rights".

The following Table 1 gives a summary of various beliefs among different coalitions.

**Table 1.** Belief systems among advocacy coalitions

	Deep-rooted Core Beliefs	Policy Core Beliefs	Instrumental beliefs
1) Government Coalition		Create an open innovation ecology with global influence	Optimization of resource allocation, integration of innovation/ industry/ talent/ funding chain
2) Platforms & Intermediaries Coalition	Self-reliance of Science & Technology Innovation Building a global science and innovation center	Enhance the capacity of S&T, nurture the ecology of innovative enterprise agglomeration	Improvement of the cultivation of S&T enterprises, provision of technology market and financial support
3) Enterprise Coalition		Discover new fields, combing basic and applied research	Provision of products and services with independent IP rights

**Source:** based on Sabatier & Weible's ACF theory (2007) by the author

### Evolution and Change of Effective Policies

As mentioned, policy evolution is driven by changing beliefs, and it is the instrumental beliefs that are the easiest to change. Therefore, the key to understanding the logic of policy evolution lies in analyzing how instrumental beliefs are changed in different scenarios, by various factors, and in different ways, along with the change of core beliefs.

*First*, changes in instrumental beliefs result from external interventions and policy orientation learning, including unexpected events, as well as environmental changes such as shifts in the international and domestic political situation, economic conditions, and constraints on public opinion.

*Second*, instrumental beliefs drive changes in common knowledge and ideas, leading to changes in institutional rules and orientations for values, which in turn lead to changes in core policy beliefs, giving rise to new policies.

*Finally*, coalition members have acquired new shared knowledge and ideas about the policy, which form the foundation of their core beliefs and instrumental beliefs.

Therefore, the three processes progress chronologically, forming a cycle that drives policy evolution.

As shown in Fig. 1, the study conceptualizes an analytical framework according to ACF theory. The content of 122 policy texts is to be analyzed with the framework.

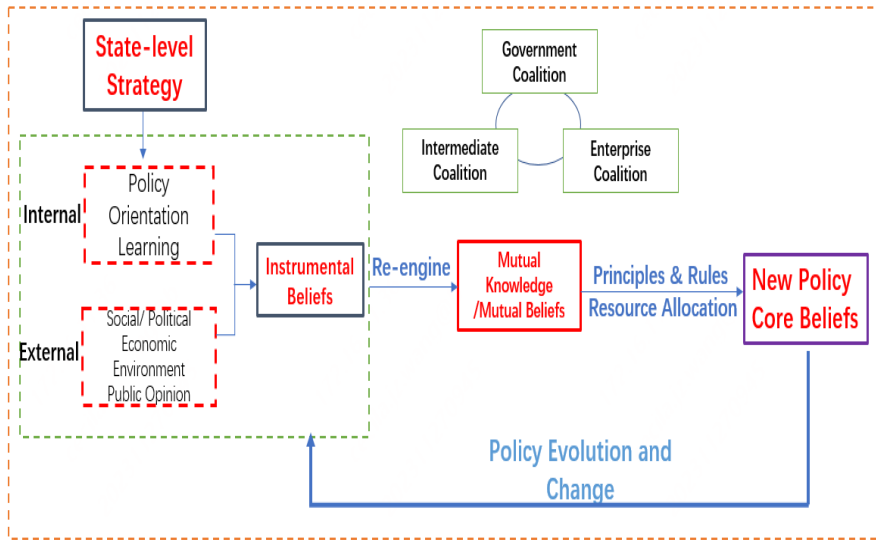


Fig. 1. Analytical Framework for the Evolution and Change of Shanghai's S&T Policy.

### 2.3 Data Sources and Data Collection

Based on the index of public information and specialized regulatory databases, the data sources include: (1) websites of the Shanghai Municipal People's Government, the Shanghai Municipal Science and Technology Commission, and the University of Beijing Regulations Database; (2) reports related to Shanghai's scientific and technological achievements statistics, scientific and technological almanacs such as the Shanghai S&T Almanac (1992-2022), the Shanghai Science and Technology Progress Report (2015-2022), and the Shanghai Science and Technology Periodicals (1995-2022).

The selection of policy documents involves three steps: (1) Conducting a keyword search for terms such as "S&T," "innovation," "technology," and "policy" to compile an initial list of 236 texts. (2) Refining the list further by keywords like "innovation-driven," "independent innovation," "technology transfer," "intellectual property rights," and "scientific and technological subsidy," resulting in a second-round list of 174 texts. (3) Reviewing the second-round list individually, taking into account of factors such as the date of issuance and implementation.

Finally, enter information such as the issuance date, subject, and main theme of the policy into the database. Meanwhile, duplicated, irrelevant, or invalid data were eliminated, resulting in 122 texts on Shanghai's S&T innovation policies spanning the 30-year period from 1992 to 2022.

### 3 Analysis of the Evolution of Shanghai's STI Policy

According to the analytical framework as shown in Fig. 1, 122 texts are to be categorized into three stages, based on the landmark events that occurred in chronological order.

Within each stage, external interventions (events and environments) and policy orientation learning are considered the key variables for changes in instrumental beliefs. Thus, followed by an analysis of how instrumental beliefs drive the development of new core beliefs, a stage-by-stage summary of the characteristics will be included in the conclusion.

#### 3.1 Cultivation Stage of "Science and Education" (1992-2005)

##### **External Interventions: Events and Circumstances**

Deng Xiaoping's Southern Tour speech in 1992 and the convening of the 14th Party Congress in the same year were significant external events during this period. The Southern Tour speech emphasized that "science and technology are the primary drivers of productivity." The report of the 14th National Congress made it clear that "a socialist market economic system should be established."

These two external events solidified the newfound belief in "top-down" manner. Subsequently, both the central and local governments reached a mutual understanding that the power of science, technology, and market-driven strategies is essential for comprehensive economic development. China's economy entered a new stage of rapid development from then on.

##### *Economic environment:*

China's economy underwent rapid development, with the proportion of secondary and tertiary industries increasing year by year. The growth laid a solid foundation for S&T innovation in various fields.

##### *Social Opinions:*

The period from 1995 to the middle of the 21st century was crucial for achieving China's three-step strategic goal of modernization. Furthermore, the 21st century is characterized by a new era dominated by science and technology. To embrace the 21st century, seizing historical opportunities, and foster a culture of innovation has become the prevailing sentiment.

Additionally, there was a growing emphasis on opening up to the world, as evidenced by increased international communications, active foreign investment, technology dialogues with developed countries, and a comprehensive demand for talented individuals. With a significant number of "returnees" starting their innovation businesses in China, a strong focus within the government coalition was put forward on S&T policy, as well as talent cultivation and talent building.

##### **Policy Orientation Learning**

The report of the "14th National Congress" stated that "the sustained, rapid, and healthy development of the economy must rely on scientific and technological progress." The reality that Shanghai's economy was facing was a lack of natural resources coupled with spatial constraints.

Therefore, the city should prioritize the issues of an unreasonable industrial structure, outdated technology, low productivity, and poor growth quality. In 1993, Shanghai took the lead in the country by declaring its intention to transform from the traditional development model that relied on high resource consumption with pollution problems. Shanghai put forward a strategic adjustment of the industrial structure to promote economic growth.

On the other hand, local governments responded positively by sending out policy-oriented learning signals. In 1993, the Law of the People's Republic of China on Scientific and Technological Progress was promulgated as the first law in the field of science and technology, which became the guiding principle for the development of S&T innovation.

In March 1995, the National Conference on Scientific and Technological Progress was held in Beijing. General Secretary Jiang Zemin emphasized once again that "we should prioritize science, technology, and education in the development of the economy and society." For the first time, the strategy of developing the country through technology and education was elevated to a national policy. This was aligned with the strategy of "developing the city through science and technology" proposed by the Second Science and Technology Conference of Shanghai in August 1995. Accordingly, the Shanghai Municipal Government issued the "Guideline on Accelerating the Progress of Science and Technology in Shanghai." This guideline aimed to provide policy provisions for fostering the high-tech industry and promoting enterprises as the main drivers of technological development.

### **Analysis of the Evolution**

In this stage, external events such as the "Southern Tour Speech" and the 14th National Congress, along with the external environment of rapid economic development and innovation concepts, public opinion, "returnees," and foreign investment, together with policy-oriented learning on industrial restructuring and the strategy of developing the city with science and education, jointly promoted the development of instrumental beliefs.

By analyzing typical policy texts during the period using the Nvivo tool, keywords such as "fiscal subsidy," "income tax," and "socialization" (as shown in Fig. 1.) reflect these instrumental beliefs.



**Fig. 2.** Keywords during the cultivation stage of "Science and Education" (1992-2005)

Under the guidance of instrumental beliefs, new knowledge and beliefs gradually formulate, leading to a shift in the core beliefs within the subsystem towards a talent-oriented city. This shift resulted in a series of new policy outcomes that reflect these core beliefs.

Typical policies to promote the development of upgrade zones include the municipal "18 Articles", Zhangjiang's "New 19 Articles", the "Opinions on Accelerating the Progress of Science and Technology in Shanghai", "Outline of Action for the Strategy of Developing the City with S&T Measures", and the "Outline of Action for the Strategy of Strengthening the City Talents Policy".

### 3.2 Growth stage emphasizing "autonomous innovation" (2006-2014)

#### External Interventions: Events and Circumstances

The 2010 Shanghai World Expo and the 18th National Congress in 2012 were significant external events during this period. The World Expo demonstrated the great achievements of China's reform and opening up, which increased Shanghai's global influence in the world. The innovation-driven development strategy was first formally proposed in the 18th National Congress.

From the perspective of the external environment, 2005 marked the beginning of the "11th Five-Year Plan" amidst complex domestic and international trends.

#### *Economic Environment:*

Former economic growth was driven by natural resources such as crude oil, coal, electricity, and oil. However, this led to overheating problems in certain industries, including iron and steel, cement, and real estate. Thus, the focus of macro-control was shifted to controlling the pace of infrastructure investment.

On the other hand, although the national import and export volume exceeded the trillion-dollar limit for the first time in 2004, the characteristic of being "huge but fragile" is obvious. Three years after joining the WTO, the textile industry and other



traditional exports faced challenges such as the abolition of quotas and anti-dumping investigations from foreign countries.

#### *Social Opinions:*

A debate known as the "He Long debate" in August 2005 took place at the Guangzhou Automobile Forum. It involved Yongtu Long, the WTO negotiator, and Guangyuan He, the former Minister of the Ministry of Mechanical Industry, which focused on the question of whether the market could be traded for technology.

Competitive advantage driven solely by cheap labor and energy consumption is unsustainable. To address the tension, social opinions was reached for the introduction of technology. Especially in the automotive, equipment, and other vital industries, the only way forward is to adhere to the "self-reliance innovation" strategy, in order to overcome the situation where important industries are controlled by others.

#### **Policy Orientation Learning**

Intermediary coalitions, represented by innovation parks, industry-university-research consortia, and innovation platforms, played a significant role in policy-oriented learning during the period. As a bridge between government and enterprises, intermediary coalitions provide a large number of policy recommendations for the construction of innovative cities.

In March 2006, Shanghai hosted its third science and technology conference. At the conference, General Secretary Hu Jintao put forward the concept of the "four firsts" to overcome the obstacles hindering development. Stimulated by the complex external environment, the coalition gradually reached a consensus on the need to utilize a wider range of policy tools to effectively coordinate issues in the field of science, technology, and innovation as the reform entered a more advanced stage. Facing structural performance transformation and external pressure, policy learning greatly focused on the development of core technologies with independent intellectual property rights.

On the other hand, the Internet revolution has driven the rapid development of digital applications. The coalition started to extensively learn from foreign experiences, focusing on the subject of innovation and the development of digital strategies. Unlike export-oriented cities such as Shenzhen, Shanghai has strategically developed key industries such as new energy, advanced manufacturing, civil aviation, and biopharmaceuticals. These industries are closely tied to the national economy and the well-being of the people.

Comparing with the previous stage, the breadth and depth of policy coverage have increased. There was now a greater emphasis on continuous support for SMEs, including funding support for their major projects. Additionally, a systematic S&T innovation policy system has been formed, which covers strategies related to intellectual property rights, talent introduction, and the mechanism for supervising and evaluating the conversion of achievements.

#### **Analysis of the Evolution**

External events such as the Shanghai World Expo and the 14th National Congress, as well as changes in the external environment such as increased competition after WTO accession, market or technology debate, and structural transformation from "quantity" to "quality," along with policy-oriented learning on independent intellectual property



lence of being "big but fragile," it was currently facing a more pressing issue of structural transformation and the need for high-quality development. In terms of external pressure, the disputes between China and the United States can be seen as an external intervention at this stage.

*Economic Environment:*

The focus of economic growth has shifted from high-speed growth to high-quality development. On the one hand, the total labor force reached its peak in 2015, and labor costs continue to rise. Therefore, there is an urgent need for industrial transformation and upgrading in order to cultivate new driving forces for growth. Thus, industrial upgrading cannot be separated from technological innovation. On the other hand, there is a contradiction between resources, the environment, and economic and social development. The contradiction can be addressed by scientific and technological innovation to compensate for development weaknesses.

*Global Environment:*

Artificial Intelligence (AI), as the representative of a new era with industrial transformation, became a hot topic. Triggered by disputes between China and the U.S., technology blockades in semiconductor, green energy, and other core industries were imposed on China. In the meantime, the discussion on globalization or anti-globalization, as well as the strategic confrontation between China and the US in various fields, are characterized by complexity and diversification under geopolitical change.

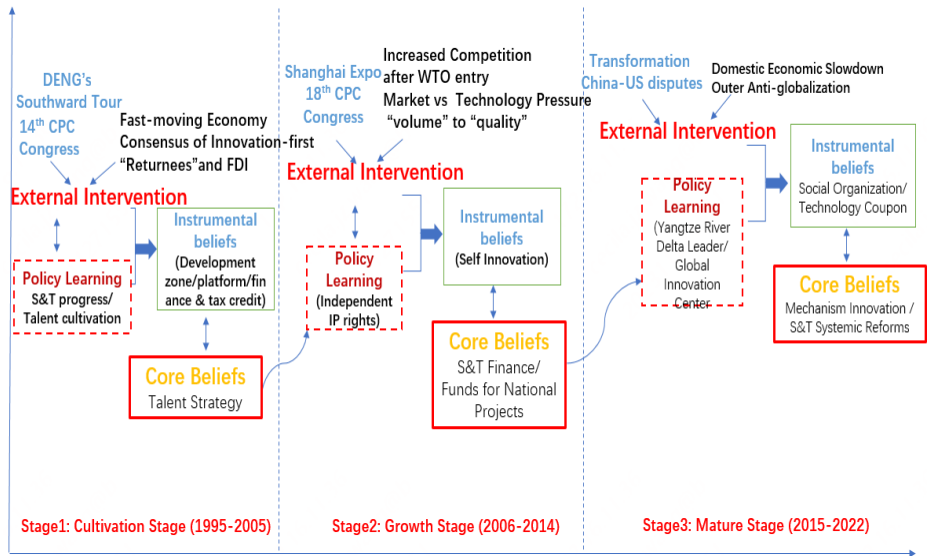
**Policy Orientation Learning**

To address the challenges posed by the overseas technology blockade and domestic economic slowdown, it is crucial to understand the policy direction within the coalition. Based on the guiding principles of "independent intellectual property rights" and "innovation-driven development" in the previous stage, it has become increasingly clear that "self-reliance in science and technology" is the key to integrating security in the industrial chain and supply chain areas from the "18th National Congress" to the "20th National Congress". It is also a guarantee to improve the quality of the supply chain and smooth out the fluctuations in the economic cycle. Therefore, the discussion on how to overcome the bottleneck and implement supply chain reform, while also stimulating domestic demand, has been ongoing. Meanwhile, in terms of regional coordinated development, the Yangtze River Delta integration strategy has become a national strategy. Shanghai, as the leading city in the Yangtze River Delta, has emerged as a pioneer in establishing a global S&T innovation center.

**Analysis of the Evolution and Change**

In this stage, external events such as the US-China disputes, economic transformation and high-quality development, external environment such as the domestic economic slowdown / globalization vs anti-globalization, and policy orientation learning such as the Yangtze River Delta leading city and construction of global S&T innovation center combine to drive the change of instrumental beliefs. Typical policy texts include keywords such as "higher education institutions", "soft sciences", "Yangtze River Delta", "social organizations", etc. (as shown in Figure 4) reflect the new instrumental belief.





**Fig. 5.** “External Intervention-Policy Orientation Learning” framework of the evolution of Shanghai Science and Technology Innovation (STI) policy

*The stage of science and education (1995-2005)*

External events such as the Southern Tour Speech and the "14th National Congress" drove policy learning, focusing on scientific and technological progress and talent cultivation which triggered instrumental belief changes and led to the implementation of specific policies, such as industrial park construction, platform development, financial investment, tax exemption, and talent protection. The joint efforts later evolved into the policy of "Outline of Action for the Implementation of the Strategy to Strengthen Talent Cultivation" in 2004, indicating the new core beliefs of infrastructure building and talent cultivation.

*The growth stage of independent innovation from 2006 to 2014*

Significant developments were triggered by policy learning on the importance of independent intellectual property rights (IPRs) during the Shanghai World Expo and the "Debate between He and Long". It led to a change in instrumental beliefs, which in turn gave rise to specific policies concerning intellectual property protection, the nine strategic emerging industries, and finance-backed science and technology. These policies were further elevated to the policy of “Measures for the Management of Funds for Major National Special Projects” introduced in 2013. As a result, autonomous and self-reliance innovation, along with finance-backed science and technology, became the new core beliefs during this stage.

*The maturity stage from 2015 to 2022*

The core of Shanghai's policy orientation learning shifted due to domestic economic transformation, high-quality development requirements, and the slowdown pressure of the global economy, along with the rise of anti-globalization sentiments in the US-European alliance. The transformation focused on leveraging the leading advantages

of the Yangtze River Delta (YRD) region to build a global innovation center. Consequently, changes in instrumental beliefs led to the formulation of a series of policies aimed at encouraging the development of scientific and technological social organizations, and promoting the Yangtze River Delta S&T vouchers and soft science bases.

Ultimately, we conclude that the transformation of instrumental beliefs and the formation of new beliefs in Shanghai's science, technology, and innovation (STI) policies are driven by both external interventions, such as external events and macro-environments, and internal policy learning of subsystems. The process is further propelled by the formation of new core beliefs, which are in turn driven by a common value orientation.

The continuous evolution of STI policies in Shanghai is centered on the deep core belief of "building a global scientific and technological innovation center". After three decades of development, Shanghai has established a comprehensive STI policy system, supplemented by various measures such as talent, funding, and infrastructure policies, all centered on the core belief mentioned above.

#### **4.2 Discussions on the Future Improvement of Shanghai's S&T Innovation Policy**

In light of the insights provided by the ACF theory, it is imperative to consider the improvements of future science, technology, and innovation policies. The new round of technological revolution has been exerting a disruptive influence on various industries, with the rapid advancement of AI. AI is functioning in various fields such as building models to collaborate with human to develop new technologies and products. Consequently, the landscape of innovation in the new era is characterized by complexity, diversification, and networking. Enterprise innovation entails not only the upgrading of technical elements and measures, but also necessitates the implementation of current policies and institutional frameworks.

##### *Soft Power - Reforms of mechanisms*

Over the past thirty years, Shanghai has made significant achievements in "hard" environment, such as attracting talent, and enhancing its infrastructure, while noting changes remained less in the soft environment, including the formulation of effective systems, rules, and mechanisms.

In the context of the ACF theory, there is a growing focus on the exploration of policy-oriented learning and the stimulation of new instrumental beliefs. It's necessary to develop policies for the technology transfer, and consider ways to further mobilize intermediary and enterprise coalitions to expand the autonomy of research activities in universities and institutes in order to boost researchers' motivation.

Additionally, it's vital to drive the reform of institutional systems and establish a market-oriented performance appraisal system. Moreover, it is crucial to encourage enterprise coalitions to take the lead in innovation and promote the provision of environmental and institutional support from the "demand side".

##### *Industry-specific Policies*

In the leading industries such as integrated circuits, biomedical, and information technology sectors, industry-specific policies should be designed to fit the diverse

characteristics of each industry. The policies could be aimed to synergize value chains with neighboring cities, in line with the national strategy of regional integration in the Yangtze River Delta. Current STI policies lack precision in their application, and the guidance for each industry is inadequate.

#### *Consistency and Sustainability*

Shanghai could leverage its core advantage of being the "front-runner" to promote the development of synergistic policies in the Yangtze River Delta. Aiming for "the year of research" in 2023, the CPC is conducting thematic education and in-depth research across China. However, current policies of the Yangtze River cities exhibit significant overlap, leading to mutual competitions among cities for people and technology, and resulting in wasted financial resources on duplicative infrastructure construction. It is crucial to foster a fair competition atmosphere among cities in the region, and to guide the allocation of different roles for each city in the industrial and innovation chain. Thus, reinforcing the effect of Shanghai's "leading role" and providing a "big-picture" mindset is crucial for a new type of mutually beneficial inter-governmental relationships.

#### *Limitations*

The limitations of the study include: (1) the study primarily focuses on reviewing the policy change under the ACF framework; (2) the methodology relies on textual analysis, which lacks of empirical data support.

To address the gap, the next step of the study will involve field research on enterprises in industrial parks, with emphasis on intermediary and enterprise coalition. Qualitative and quantitative tools will be supplemented to enhance the database by capturing the "demand side" of innovation activities.

Furthermore, the field of science and technology involves various subsystems such as funding activities, technology transfer, and investment transformation. Future research may explore different subsystems respectively, which may provide potential directions for further research.

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