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**New Technology, New Era and New Incubation Mode**

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## New Technology, New Era and New Incubation Mode

### Abstract:

Since the birth of the enterprise incubators concept in the 1950s, enterprise incubators have been rapidly expanded in the world after half a century of development, especially in developing countries in the past decade. As early as 2007, the quantity of high-tech enterprise incubators in China already ranked second in the world. High-tech enterprise incubators, as an important part of national/regional innovation systems, are playing a more and more important role in regional/urban innovation construction systems. However, with the continuous growth of population and the aggravation of land resource scarcity, the spatial expansion mode of traditional incubators has faced a great bottleneck. Therefore, future sustainable development will be impossible unless entrepreneurial enterprises are nurtured carefully by means of deepened service and entrepreneurial investment. In this context, the paper summarizes the problems faced by the traditional incubation mode, discusses the new development direction of the future incubation mode by analyzing the development requirements of new technologies and new industries, and takes the TusStar cultivation program as an example to analyze how to create a better entrepreneurial environment and provide high quality entrepreneurial services for entrepreneurs.

### I. Concept and Development of Incubator

Enterprise incubators were originated from the United States in the 1950s as a result of the emergence of the new technological revolution. As enterprise incubators play a great role in promoting the development of high-tech industries, incubating and cultivating high-tech SMEs and entrepreneurial pioneers, revitalizing the regional economy and developing the new economic growth point, they have attracted the great attention from governments around the world, which has further promoted their rapid development throughout the world. In the mid-and-late 1980s, incubators were developed rapidly in the United States, which resulted in the emergence of a large number of incubation projects as important pushers of development of newly-founded enterprises in the United States. At the same time, the European Commission began to vigorously support its member countries to establish incubators. For example, Israeli high-tech industries made rapid development and remarkable achievements through the "incubator program". At present, the quantity of its high-tech enterprises is only second to that of the United States.

Traditional incubators provide the external service support required for enterprise development. Generally, based on governmental guidance and corporate operation, traditional incubators act as intermediary organizations that use their own channels to help newly-founded enterprises coordinate various social resources, so that the social resources can get integrated into business competencies for the sake of the growth of enterprises. China's technological enterprise incubators are positioned as the service organizations directly integrating social resources to provide the entrepreneurial incubation service for entrepreneurial enterprises, cultivate entrepreneurial enterprises and train entrepreneurs, the bridges of connecting practical technological innovation sources with high-tech industries, and the important carriers of realizing the industrialization of independent innovation achievements.

China attaches great importance to the development of technological enterprise incubators. During the "Eleventh Five-year Plan" period, China formulated a series of policies and measures supporting the technological innovation and entrepreneurship and developing the incubator undertakings, which rendered the strategic orientation of building an innovation-oriented country. The Outline of National Program for

Long- and Medium-Term Scientific and Technological Development (2006-2020) and the Outline of National Medium- and Long-term Program for Talent Development (2010-2020) have proposed the increase of the investment in entrepreneurial incubator infrastructures and the establishment of the entrepreneurial service network, and have tried out the taxation reduction and exemption policy for incubators; the Twelfth Five-year Plan for National Technological Enterprise Incubators has clearly proposed that China should be built into an incubator-based superpower, which means that China's incubator construction has entered a new stage. In addition, many local governments have issued policy documents to outline the strategy of developing incubator industries as a great support for them (see Figure 1). As of 2015, the quantity of incubators in China has reached 1,500, including 500 state-level incubators. Among state-level incubators, over 30% of them have established entrepreneurial nursery businesses and enterprise accelerators, over 50% of them have been available with angel investment and shareholding incubation, over 60% of them have provided their staff with professional incubator trainings, 80% of them have established public technological service platforms and 90% of them have formed entrepreneurial mentoring systems (see Figure 2).

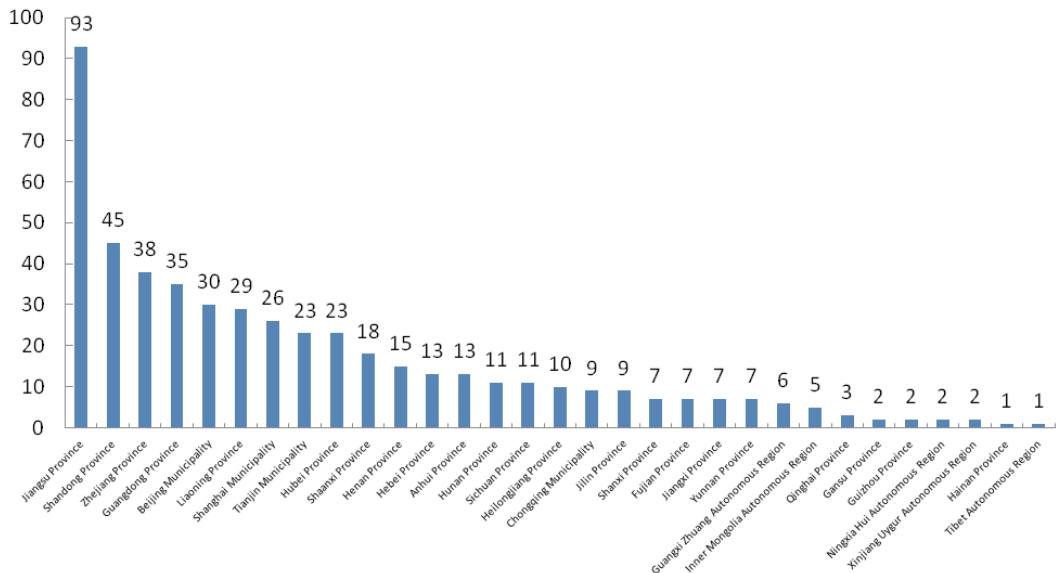


Figure 1 Quantity of State-level Technological Enterprise Incubators in Different Provinces (Autonomous Regions and Municipalities) by the End of 2013

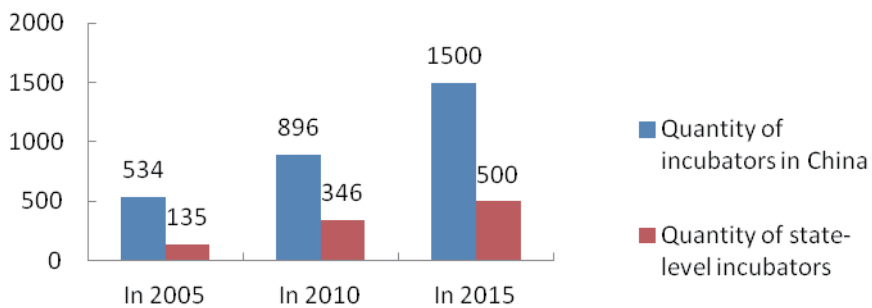


Figure 2 Tendency Chart for Quantity of Incubators in China

## II. Operation Mode of Traditional Incubators

Incubators can be divided by initiation purpose and control subject into state-backed incubators and private incubators.

### 1. Main Operation Mode of State-backed Incubators

Original state-backed incubators were mainly dominated by governments. The operation of incubators was maintained through transferring the land or property assets by governments at a zero or low price, attracting enterprises to enter incubators by free charge or lower rental, relying on rent subsidies or other fund supports and collecting a small amount of rental and service charge from incubated enterprises. Its essence was the real estate development and operation. With the continuous increase of national support in innovation and entrepreneurship, the upsurge of social entrepreneurial enthusiasm and the emergence of various innovative incubators, state-backed incubators have shifted to marketization. On the one hand, state-backed incubators that have carried out marketization since their establishment have occurred, such as Legend Star and Virtue Inno Valley. Except for their state-backed control subjects, the specific operation of these incubators is almost the same as that of private incubators. For instance, Legend Star and Virtue Inno Valley lay particular stress on the investment in incubated enterprises and provide the investment and financing docking, growth management, training and other in-depth services for incubated enterprises. On the other hand, some state-backed incubators have incubated the vertical field according to local competitive industries. For example, the entrepreneurial site in Chengdu Tianfu Software Park has taken advantage of convergence of software industry resources in Chengdu Tianfu Software Park to become the gathering area of mobile Internet entrepreneurs.

### 2. Main Operation Mode of Private Incubators

Private incubators can be divided by initiation purpose, initiation subject and profit mode into investment-driven incubators, industry-driven incubators and intermediary incubators. Accordingly, the operation modes of these three types of incubators are also different.

(1) Investment-driven incubators aim to obtain benefits through the investment in incubated enterprises. In particular, they aim at an extension from the VC investment stage to the early stage. Typical examples include Innovation Works and InnoSpace. Investment-driven incubators will strictly screen incubated enterprises and carry out the early-stage investment in satisfactory projects. As for the services for entrepreneurial projects, in addition to providing office space, finance, law and other basic services, an outstanding feature of investment-driven incubators is to lay more particular stress on the growth management and track of entrepreneurial projects, including the mastery of industry research, trend judgment, products and commercial modes, the organization of newly-established teams and other value-added services.

Category	Characteristics
Investment stage	Seed and angel investment
Investment finance	Several hundred thousand to several million
Equity proportion	Less than 10%
Exit time	Round A and Round B
Service characteristics	Growth track and management

Table 1 Operation Mode of Investment-oriented Incubators

(2) Industry-driven incubators are established on the basis of industrial capital. Typical incubators include Microsoft Ventures Accelerator. Compared with investment-driven incubators, industry-driven incubators have a less consideration to the financial returns. As for the services for entrepreneurial projects, the resources provided by industry-driven incubators are massive. Industrial capital can provide a large number of free businesses and resources for incubated enterprises through its own business advantages.

(3) Intermediary incubators cannot rely on industrial capital or obtain profits through investment-driven incubated enterprises but lay more particular stress on the services for incubated enterprises. Typical incubators include Cheku Cafe and Krypton Space. As for the selection of entrepreneurial projects, different from higher and even strict elimination standards set up by investment-driven incubators and industry-driven incubators, intermediary incubators set up the relatively low admittance threshold and even no admittance threshold, so as to provide services for all entrepreneurs. The services provided by intermediary incubators generally include office space, law, finance and other basic services, which will help incubated enterprises carry out the investment and financing docking; some incubators even introduce mentoring systems to mentor incubated enterprises.

Category	Characteristics
Emphasis point	Entrepreneurial service team
Project screening	Lower or no threshold
Project expenses	Lower or no
Profit mode	In groping stage
Service characteristics	Basic operation + resource docking

Table 2 Operation Mode of Intermediary Incubators

### III. Challenge Faced by Incubators under the Background of New Technology and New Era

With the continuous growth of population and the aggravation of land resource scarcity, the spatial expansion mode of traditional incubators has faced a great bottleneck. In addition, with the rapid development and application of internet technologies, the competition between incubators has gradually expanded from cities and regions to the world, which requires that incubators can nurture entrepreneurial enterprises carefully by means of deepened service and entrepreneurial investment, so as to stand out from the competition for the sake of future sustainable development.

#### 1. New Trend of Global Technological Development in the New Era

(1) Scientific and technological development tends to be accelerated and integrated. There is a mutual cross-penetration between disciplines, science and technology, natural science and humanistic social science. Therefore, many interdisciplinary fields have been born. The integration of nano-science, information science, life science and cognitive science promotes the leap of human overall cognitive ability. The research on fundamental particles, genes, micromechanics, micromachining, nano-materials and other micro-worlds and the research on the network system, economic system, ecological system, brain and life system and other complex systems are breaking through the limitation of human traditional cognition, which indicates that science and technology have entered an unprecedented intensive innovation era. The global scientific

and technological development is entering a most active innovation era, and the frontier technology field is gestating a new breakthrough.

(2) Globalization of scientific and technological activities and talents. Under the trend of global integration, scientific and technological activities have not been limited to a country, and the scientific and technological talents and resources, research objects, influences and functions have had international characteristics. The frequency of scale activities of scientific and technical personnel going abroad for participating in the cooperative research or inviting foreign partners to China for research has been rapidly increased, and scientific and technological personnel's opportunities to participate in international conferences for global cooperation and exchange have been greatly increased.

## **2. Challenge Faced by Incubators**

Under the background of new era and new technological development, the incubator industry is also rapidly developing. However, during the rapid expansion of quantity and quality, how to improve the efficiency of aggregation and docking of resources, how to look for high-quality projects and how to build the incubation environment more suitable for international innovative talents in the new era have become the main challenges that most incubators face.

(1) How to realize the resource docking efficiently. Traditional incubators mainly realize the gradual increase of their own quality and resource platforms through the space expansion mode; entity space is the main platform of personnel recruitment, investment and financing, market promotion, customer docking and other services. However, with the continuous increase of population and the aggravation of land resource scarcity, the space expansion mode of traditional incubators not only has high costs but also cannot meet the explosive increase of entrepreneurial enterprises on resources and talent demand.

(2) How to look for and seize high-quality projects in the fierce competition. The quality of incubated enterprises represents the quality of incubators, and the quality of graduate projects is the reference of attracting other excellent project to enter incubators. In 2015, the total quantity of incubators in China exceeded 1,500. In the Internet era, the global incubators almost stand on the same platform for competition; how to highlight our own advantages in many incubators to attract excellent entrepreneurial projects is the great challenge for the current and future incubators. Therefore, how to define good entrepreneurial projects, how to determine the development trend of future technologies and businesses and how to identify which entrepreneurial projects will have an explosive increase in the future have formed a severe test for the experience, eyesight and trend judgment of incubators.

(3) How to build the incubation environment more suitable for international innovative talents. At present, the entrepreneurial crowd shows a trend of internationalization, youthization and higher education; they usually occupy an active position in the entrepreneurial process and have a very clear cognition on the demand for enterprise development; simultaneously, they have the strong demand for individual satisfaction and favor the incubators more suitable for themselves, which puts forward new requirements on the development orientation of incubators.

## **IV. Countermeasures and Suggestions on Future Incubation Mode Development**

The development of incubators is closely related to the change of science and technology and era background. With the deepening of mobile Internet and the development of global technological industries, the following suggestions and countermeasures are put forward by this paper according to the challenge that

the development of incubators faces under the background of new era and new technology:

(1) Professional Orientation: Enterprises and incubators will face the global fierce competition under the background of internet. For entrepreneurial enterprises, they need to realize their rapid growth through their own rapid iteration and rapid resource docking. Therefore, incubators provide accurate services for incubated enterprises in the vertical field through the professional orientation, select the necessary resources according to products, start the product innovation system through resource factors, and realize the marketization and industrialization of creative projects through the virtuous cycle of creative projects, resource costs and target customers. Compared with the incubators with many incubation themes, the incubators with professional orientation and severe verticality are more pertinent in the resource docking and are easier to gather the entrepreneurial projects of the segmenting field and give play to the aggregation effects of resources.

Take the first nano professional incubator in Beijing - Tus Nano-incubator as an example. It emphasizes the whole industry chain services of nano professional incubators from the contact of project research and development stage to the project achievement transformation intention and the concentrated batches of new incubation; simultaneously, the whole process is accompanied by the feedback and guidance, so as to master the scientific research direction and achieve the key breakthrough and efficient incubation production. Finally, TusPark incubators dock the project industrialization to Beijing Nanotechnology Industrial Park and other industrialization bases, so as to realize the agglomeration effects of nanotechnology in the industrialization stage. The channel of nanotechnology industrialization is dredged thoroughly through the above measures, so as to make the nanotechnology really become the key technology industry that can support the upgrading of industries in Beijing and even in the whole society. In 2013, a number of special nanotechnology achievement projects were shortlisted through the recommendation of Tus Nano-incubator and had obtained financial support, including HyperStrong, Supreme Power Solutions, Sinldo and Tumems.

(2) "Virtual" Incubation: The key to the success of entrepreneurial enterprises is the full use of resources and talents. The "virtual" incubation platform established based on the internet and big data can break through the space limitation to realize the barrier-free interconnection and interworking of resources, projects and funds through the network virtual incubator, so as to get rid of the limitation of the site on the incubator space through the mode of "light assets and service supremacy" and flexibly integrate and utilize the resources and talents.

Virtual incubators were listed as a part of "STARTUP AMERICA" Program by the American government in 2012. The Mott fund subsidy is US\$ 995.5 thousand, which subsidizes 10 pilot virtual incubators to help more newly-founded enterprises. Based on this, the resources of Silicon Valley can be transmitted all over the world through the mode of remote service. Israeli and Palestinian authority organs have used the collaborative virtual advanced technology to build a cross-regional virtual incubator, namely Palestine-Israel Virtual Incubator (PIVI). This project will allow high-tech and innovative enterprises to share the existing incubator network, so as to obtain more business opportunities and use more professional resources and knowledge through the virtualization services provided by the incubator network.

(3) Greater Interaction between Domestic and Overseas Incubators: The interaction between domestic and overseas incubators includes the construction of overseas bases of domestic incubators, the expansion of overseas incubators in China and the communication and interaction between domestic and overseas incubators. With the deepening of mobile Internet, the global technology industry development is synchronous increasingly. Accordingly, the innovation degree of domestic and overseas incubated entrepreneurial projects in the technology and business mode is synchronous increasingly. With the acceleration of globalization flow of industry resources, domestic and overseas markets have also become the important factors which

entrepreneurial projects consider. Therefore, the interaction between domestic and overseas incubators not only can make entrepreneurial projects fully use the resources of the two markets but also provide more project resources and incubation and investment opportunities for incubators. At present, China's TusStar Entrepreneurial Incubator, Hanhai Zhiye and other institutions have built overseas incubators, and China's TechTemple has achieved the resource interchange through the cooperation with overseas incubators.

In 2012, InnoSpring Incubator was formally established jointly by TusHoldings, Shui On Group, Northern Light Venture Capital and Silicon Valley Bank in Silicon Valley. After that, TusHoldings has established technology transaction centers, entrepreneurial incubators and other institution successively in South Korea, Hong Kong and other regions, so as to establish the global innovative and entrepreneurial network and better build the incubators that are more international and more attractive to entrepreneurs and available with global resources.

(4) Internet + Incubation Crowd-funding: There are two very important driving forces in the internet; the first one is big data and the second one is creative design. Crowd-funding has a core concept, namely innovative incubation; before a good project is not listed, crowd-funding can find a group of users for merchants; these users can participate in all links of product production, and their experience on products can stimulate countless creativities. To penetrate users' ideas into products is the intelligence raising but not the simple money raising, which can promote the projects and products to develop towards the direction of diversification and individuation; simultaneously through the utilization of the big data technology in the internet, the background investigation of founders can be formed according to the education background, work experience, etc. of entrepreneurs and the industry analysis is formed through the existing data information; the final valuation and marking of projects will be carried out after referring to the industry valuation of Silicon Valley, etc. After the analysis on this series of entrepreneurial projects is completed, the final report will be sent to the potential investors on the platform according to the investment preference.

"Taobao Crowd-funding" is an incubation platform positioned on innovative creatives to help designers and creatives to realize the commercial value. As of April 10, 2015, Taobao Crowd-funding has had 1000 online crowd-funding projects in total, and the number of participants has exceeded 1.5 million; the maximum crowd-funding amount of single project has exceeded RMB 15 million, and the accumulative crowd-funding amount has exceeded RMB 200 million. The crowd-funding amount of technological projects has occupied 90%. In the research and development and production stage, Taobao Crowd-funding will communicate with entrepreneurs to meet the incubation creation and market feedback. Crowd-funding will become the large Taobao system after success; after the official listing, the products can be undertaken in Taobao, Tmall and Juhuasuan Group Purchase; subsequently, cloud computing and intelligent cloud will help them in intelligentization and finally 1688 will provide the tools transformed to the market. When all marketing tools are implemented, there will be investment, equity, financing, etc. in the ecosphere, so as to push enterprises to the international market for further take-off.

## **V.Practice of "TusStar" Cultivation Program**

"TusStar" Cultivation Program is the entrepreneurial project which is initiated by the TusHoldings in TusPark and collects "the leading industry innovation technologies or the business modes based on the technologies" from the world; the excellent entrepreneurs with excellent business modes and entrepreneurial spirit shall be selected from the world based on TusPark entrepreneurial incubators. Through the "incubation service + entrepreneurship training + angel investment + open platform" and other modes, the whole chain of innovation service support shall be provided for enterprises, so as to build the fenceless TusPark.



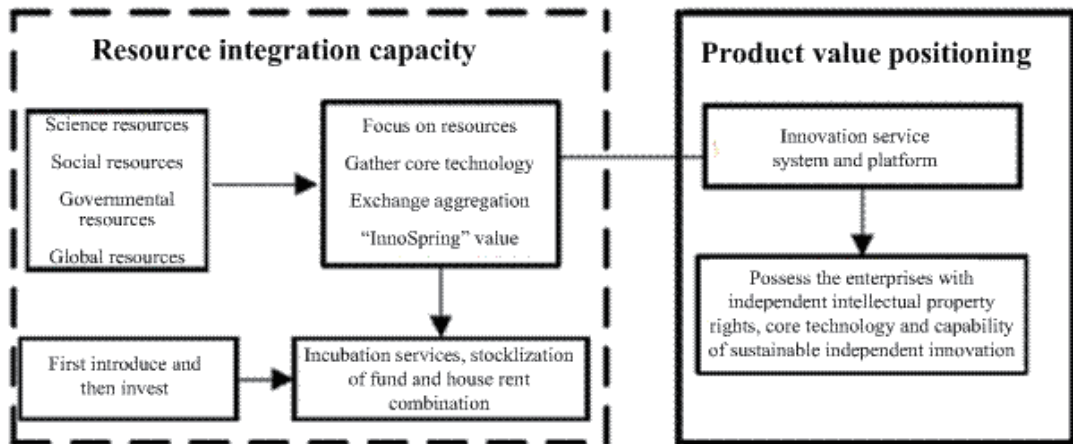


Figure 3 Resource Integration Mode of "TusStar" Cultivation Program

The "TusStar" Cultivation Program is upwards connected with the "TusStar" entrepreneurial camp and downwards connected with the "diamond program" of TusPark; through the innovative operation mode, the entrepreneurship training, incubation services, entrepreneurship mentors and other various factors shall be centralized together to provide the comprehensive services for entrepreneurs; various chargeable entrepreneurial consultation service items shall be developed for all members entering the camp in the completely free form; the investors, entrepreneurial elites, industry consultants and other professional personnel shall be specifically recommended to the entrepreneurial camp college; simultaneously, this plan takes the domestic and overseas incubators subordinate to TusPark as the foundation to build the innovative network of interconnection and interworking, so as to become a key link in the complete incubation chain of TusPark. As of July 2014, with the continuous promotion of the TusStar Cultivation Program, 8 TusStar incubation bases had been established all over the country, which had attracted nearly 300 incubated enterprises, held more than 200 entrepreneurial trainings and carried out more than 50 investment and financing activities.

## Conclusion

Enterprise incubators, as an important part of national and regional innovation systems, play a very important role in the regional/urban innovation construction system. In the rapid development process, the space expansion mode of traditional incubators faces a great bottleneck in the aspects of resource utilization, project acquisition, etc. With the acceleration and cross-integration of scientific and technological development and the increasing globalization of scientific and technological resources and talents, enterprise incubators should timely adjust the development mode, accelerate their own iteration speed, fully utilize the internet and big data, carry out the intensive farming in the severe vertical field, deeply analyze the demand for new technologies and new industry development, adopt the mode of the combination between entity space and virtual incubation and furthest integrate and utilize resources, which will enable to build a better entrepreneurial environment and provide more accurate and efficient incubation services for the international innovative and entrepreneurial talents receiving higher education.