

Analysis on the Development Countermeasures of Shandong Science and Technology Business Incubator

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Abstract: In recent years, Shandong Province has focused on optimizing the planning and layout of technology business incubators, guiding the increase in the degree of specialization of technology business incubators, strengthening policy matching and effective integration, and increasing technology and financial support. This has made Shandong Province incubators Comprehensive breakthroughs have been achieved in scale, types, infrastructure, social networks, service functions and quality, and incubation effects. However, with the rapid development of technology business incubators, on the one hand, people's awareness of business incubators is still at a perceptual level. As a result, business incubators (also called entrepreneurial parks, centers, etc.) in many places only have the name of entrepreneurship, but Without the reality of incubation, the old routine of "property management + preferential policies" has never been able to go out; on the other hand, on June 27, 2019, the program "Wen Zheng Shandong" broadcast by Shandong Radio and Television Station exposed some incubator development chaos , Has caused the society to question the development of Shandong incubator. After the program was broadcast, the Provincial Department of Science and Technology conducted a dragnet investigation and standardized rectification of the incubators and entrepreneurial spaces it managed. Therefore, in order to better promote the development of incubators and makerspaces in our province, it is urgent to study the development strategies of incubators and makerspaces in our province.

1. Introduction

In September 2014, Premier Li Keqiang formally put forward the call of "Mass Entrepreneurship, Innovation for All" at the Summer Davos Forum. Opinions, a series of opinions, have effectively promoted the strategy of innovation-driven development and stimulated market vitality and social creativity. The rapid development of incubators has not only promoted the rapid improvement of my country's scientific and technological innovation capabilities, but also made

great contributions to industrial upgrading and the optimal allocation of social capital wealth ^[1]. Since June 1987, my country's first technology business incubator was established in Wuhan Donghu. By the end of 2019, the number of national incubators has reached 5,206, and the number of national-level incubators has reached 1,307. It has played an important role in promoting the transformation of scientific and technological achievements and cultivating high-tech enterprises and entrepreneurs.

In 1959, Joseph Mancuso established the world's first technology business incubator-Batavia Industrial Center (Batavia Industrial Center) in New York, USA. Since then, the concept of technology business incubators has been formally put forward. In May 1987, American incubator expert Rustan Lakaka introduced this concept to China; in June of the same year, China's first technology business incubator, Wuhan East Lake New Technology Entrepreneurship Center, was officially established.

In recent years, the research results on technology business incubators have been quite fruitful. Generally speaking, these studies focus on the development model, operating mechanism, operating efficiency, driving effect, and experience reference. At the development model level, Lu Gang et al. proposed a technology business incubator 4.0 model characterized by ecology and system^[2]; Xu Tao et al. proposed a model for cultivating, conserving and developing talents from the perspective of talent development^[3].

In recent years, Shandong Province has focused on optimizing the planning and layout of technology business incubators, guiding the increase in the degree of specialization of technology business incubators, strengthening policy matching and effective integration, and increasing technology and financial support. This has made Shandong Province incubators Comprehensive breakthroughs have been achieved in scale, types, infrastructure, social networks, service functions and quality, and incubation effects. On November 6, 2019, the Shandong Provincial Government Information Office stated that there were 22,142 incubating enterprises in the Shandong Science and Technology Business Incubator, 8,215 enterprises in the national science and technology SME database, and more than 8,900 high-tech enterprises.

However, with the rapid development of technology business incubators, on the one hand, people's awareness of business incubators is still at a perceptual level. As a result, business incubators (also called entrepreneurial parks, centers, etc.) in many places only have the name of entrepreneurship, but Without the reality of incubation, the old routine of "property management + preferential policies" has never been able to go out; on the other hand, on June 27, 2019, the program "Wen Zheng Shandong" broadcast by Shandong Radio and Television Station exposed some incubator development chaos , Has caused the society to question the development of Shandong incubator. After the program was broadcast, the Provincial Department of Science and Technology conducted a dragnet investigation and standardized rectification of the incubators and entrepreneurial spaces it managed. Therefore, in order to better promote the development of incubators and crowd-creation spaces in our province, it is urgent to study the development strategies of our province's incubators.

2. Development Status and Outstanding Issues

Although the Shandong Science and Technology Business Incubator started late, it has developed rapidly. As of the end of 2018, Shandong Province had 378 technology business incubators, of which 83 were national technology business incubators, the number of incubating enterprises was 16,840, of which 832 were high-tech enterprises, and the cumulative number of graduated enterprises reached 11,332; the total incubation area was 14.62 10,000 square meters, the total income of incubators reached 2.082 billion yuan, forming an incubation network system

covering the whole province^[4]. Through data sorting and investigation, it is found that the following outstanding problems exist in the development process of Shandong Science and Technology Business Incubator.

2.1 The Characteristics Are Not Obvious, and the Competition for Homogeneity is Serious

According to the survey, the trend of convergence between the crowd-creation space and the incubator is serious, and the lack of its own characteristics has become a common problem of the technology business incubator and the crowd-creation space at this stage. According to the survey on the on-site evaluation and seminars of various technology business incubators and Maker Spaces, it is found that, with the exception of some excellent technology business incubators and Maker Spaces, most of them do not have their own distinctive advantages and lack long-term development plans for their own development. In the future, there is no clear goal and development direction for future operations, and it is impossible to form its own brand value.

2.2 Insufficient Profitability of Operating Entities

According to the analysis of the operation status of technology business incubators and makers' spaces, it is found that the service income of technology business incubators and makers' spaces accounts for a relatively low proportion. The service income of technology business incubators accounts for about 30% of the total income, while the service income of makers' spaces It only accounts for about 20% of total revenue. The main profitability of technology business incubators and crowd-creation spaces is still based on government funding and rent income. This has resulted in technology business incubators and crowd-creation spaces that are recognized or filed by housing leases. After lack of government support, Self-survivability has declined sharply. For example, some technology business incubators need to rely on their own operations to make profits after receiving various government support funds, because the rent provided to the incubating enterprises is low, and the services provided are low or free. In this case, the profit that can be obtained is very small, and it is impossible to maintain the daily expenses of the operating entity. In this case, investors withdraw their capital and cause the company to withdraw. The characteristics of each co-creation space are different, and the special service fee obtained by providing special services is not applicable to all co-creation spaces and incubators, and its profit margin cannot be determined. There are also incubators and makers' spaces that profit by acquiring shares by investing and financing startups, but this process is long and risky, and there are few incubators and makers' spaces that can withstand them.

2.3 Unbalanced Regional Development

The evaluation data collected through on-site evaluation and analysis found that there are serious regional imbalances in the development of Shandong technology business incubators and crowd-creation spaces at this stage. On the one hand, there is uneven development between cities. The development of crowd-creation spaces and technology business incubators in developed areas such as Jinan and Qingdao has become more active, becoming a concentrated flashpoint for innovative companies. On the other hand, the development of cities within the city is uneven, such as Jinan in the high-tech zone, Lixia District, the development momentum is good, Shizhong District, Tianqiao District, Huaiyin District, Changqing District, Zhangqiu District, Licheng District, the creative space and technology business incubator have also been very good development, but in Shanghe County , Jiyang District, Pingyin County, Laiwu District, Laiwu High-tech Zone, the development tends to be quiet, and only individual co-creation spaces and

technology business incubators are scattered. Guest clerk.

2.4 The Service System is Not Perfect

Many incubators and crowd-creation spaces only solve the problem of the venue, without providing corresponding supporting services, lack of experienced professional management talents and operation teams, limited capabilities and limited resources. Various incubators and crowd-creation space publicity can provide multiple services, but most of them are limited to basic services and lack professional high-level services, such as investment and financing, professional guidance, market resources, project promotion, etc. The level of professionalism of entrepreneurial tutors is uneven, and the reference suggestions provided to entrepreneurs are limited, and they cannot provide substantive help. In addition, technology business incubators and crowd-creation spaces lack the exploration of service requirements for the development of enterprises at various stages, and also lack the innovation of their own value-added service model thinking. Under this circumstance, it is impossible to give full play to the capital advantages such as technology and human resources in the region, and ultimately it is impossible to better provide scientific, reasonable and effective one-stop innovation and entrepreneurship incubation services for start-ups in the region.

2.5 Lack of Professional Management Talents, and the Ability of Entrepreneurial Service Personnel Needs to Be Improved

The survey found that there is a lack of professional management talents for incubators and crowd-creation spaces. On the one hand, entrepreneurial service personnel are highly mobile, and on the other hand, many incubator practitioners have not received systematic training, which leads to the inability to provide targeted entrepreneurial companies. Sexual service. In the early stage of our province, only Qingdao, Zibo and other regions organized training for employees of technology business incubators. Most of the training is concentrated on a certain number of days, and there is a lack of continuous learning and training in the later period.

2.6 Some System Barriers Still Exist

At present, a large number of supportive policies for entrepreneurship and innovation have been issued throughout Shandong. However, due to limited policy propaganda methods, many incubators and crowd-creation spaces cannot receive relevant policies in the first time, and their understanding of policies is also different. Makers cannot fully understand and enjoy the intent and information of the policy.

3. Suggestions on Promoting the Development of Technology Business Incubators in Shandong Province

Through the research and analysis of the status quo of Shandong technology business incubators, this article mainly proposes the following development countermeasures and suggestions.

3.1 Taking into Account Comprehensiveness and Advancing Specialization

According to the survey, the trend of convergence between the crowd-creation space and the incubator is serious, and the lack of its own characteristics has become a common problem of the technology business incubator and the crowd-creation space at this stage. According to the survey

of various technology business incubators and makerspaces on-site evaluations and discussions, it is found that only a very small number of technology business incubators and makerspaces have formed their own unique brand advantages, while most incubators do not have their own unique advantages and lack the long-term development plan for its own development does not have clear goals and development directions, and it is impossible to tap its own characteristics and advantages, and thus it is difficult to form its own brand value.

From a professional point of view, most of the technology business incubators in our province are mainly comprehensive incubators and have a wider audience. However, the incubated companies cannot get corresponding professional services on many professional issues. In the future, the development of emerging industries will surely promote the sustainable development of specialized incubators, and specialized incubators will bring personalized services tailored to local conditions. Specialized incubators can help start-ups to accurately find their core competitiveness and use them cleverly. More importantly, specialization should be separated from emerging industry. Specialized incubators should not contradict the incubation of traditional industry projects while professionally incubating emerging industry projects. This not only takes into account the comprehensive connotation, but also focuses on the development of specialization.

From the perspective of the development process of the reform and transformation of technology business incubators, the development towards specialization is an inevitable trend. Therefore, this requires technology business incubators to conduct in-depth exploration from the perspective of specialization during development, establish a professional incubation mechanism, and organize The professional review team of the screening project stationed in the incubator, as well as the professional entrepreneurial training mentor team. From the establishment of the enterprise to the graduation of the enterprise, it provides a full-process and all-round professional incubation service. At the same time, we must pay attention to the establishment of a mature and professional incubator operation team. Only the establishment of a professional team can guarantee the reform, transformation and development of the incubator of science and technology enterprises. Operators must be familiar with the knowledge of management and investment, strengthen social activities and communication skills, and strive for each member of the team to become a professional incubator service personnel.

3.2 Enhance the Profitability of Incubators and Broaden Income Channels

According to the analysis of the operating conditions of technology business incubators, it is found that the service income of technology business incubators accounts for a relatively low proportion, accounting for only about 30% of the total income. At this stage, the main profitability of technology business incubators is still government funding and rent income. This has resulted in technology business incubators that are certified or filed by housing leases. Without government support, their ability to survive has declined sharply. . For example, some technology business incubators, after having obtained various government support funds, need to rely on their own operations to make a profit, because the rent provided to the incubating enterprises is low, and the services provided are low or free. The profit is very small, and it is impossible to maintain the daily expenses of the operating entity. In this case, investors withdraw their capital and cause the company to withdraw.

In the process of reform, transformation and development of high-tech business incubators, we must pay full attention to the close integration of virtualized operation development and current network technology. Under the development opportunity of transformation and upgrading, we should focus on reducing our own burden, and expand business incubator competition business to improve market competition. Only by strengthening these aspects can we ensure the realization of

the reform and transformation goals. The VC+IP+CRO (venture investment + intellectual property + R&D outsourcing service) model has been widely used. Through virtualized operation and development, it strives to become a driving force to promote the reform, transformation and development of China's technology business incubators.

3.3 Coordinating Regional Coordinated Development

The evaluation data collected through on-site evaluation and analysis found that there is a serious regional imbalance in the development of Shandong technology business incubators at this stage. On the one hand, there is uneven development among cities. The development of technology business incubators in developed areas such as Jinan and Qingdao is relatively active, becoming a concentrated flashpoint for innovative enterprises. In addition, the development within the city is uneven. For example, Jinan's development momentum in the high-tech zone and Lixia District is relatively good, and the technology business incubators in Shizhong District, Tianqiao District, Huaiyin District, Changqing District, Zhangqiu District, and Licheng District have also been obtained. However, the development of Shanghe County, Jiyang District, Pingyin County, Laiwu District, and Laiwu High-tech Zone tends to be quiet. Only a few technology business incubators are scattered, and the evaluation team can hardly see it during on-site evaluation. Resident enterprises or makers. The main measures are as follows:

One is to improve the ability of incubators to integrate resources. Strengthen the circulation of regional human, material and financial resources in the incubator industry, establish a linkage mechanism between incubators and various innovation and entrepreneurship entities and third-party institutions, and strengthen the docking and cooperation between incubators and universities, scientific research institutes and leading enterprises in the industry. To promote the inflow of talents and technical resources from universities and scientific research institutions to the incubator, feed back the industry innovation demand information of industry leaders to the incubating enterprises, promote the cyclical development of resource input and benefit output, increase the conversion rate of scientific and technological achievements, and realize mutual benefit A win-win situation.

The second is to strengthen the collaboration capabilities of incubators in the region. Accelerate the establishment of regional technology business incubator association alliances or associations, with incubator committees and venture capital committees, to publicize and implement national and Shandong provincial double-creation policies, study major theories and solve practical problems, and build incubators. Start-up enterprises and government departments contact and exchange bridges and bonds, provide timely research results with reference value for the society, and provide theoretical support for innovation and entrepreneurship in the province. The alliance can regularly carry out incubator industry exchange seminars, promote experience exchange and complementary cooperation between incubators in the region, promote the development of incubators in the direction of specialization, standardization and internationalization, and organize various innovation and entrepreneurship competitions to encourage outstanding innovation Entrepreneurship projects settled in the incubator to improve the success rate of entrepreneurship of the incubator enterprises.

The third is to expand the scope of cross-regional cooperation. Focus on building a collaborative development network of incubators in Jinan, Qingdao and other regions, and establish cross-regional incubator alliances and associations to promote the sharing of various incubation resources and experiences within and between regions. Encourage inter-regional incubators to carry out complementary cooperation and common development through forms such as team assistance, off-site incubation, and cooperative construction. Promote the flow of various entrepreneurial factors such as capital, talents, and technology between regions, so as to achieve the coordinated

development of regional incubators. Establish “incubation enclaves” in domestic first-tier cities and overseas developed regions to carry out off-site incubation of early-stage projects. Developed regions such as Guangdong and Jiangsu are the leading areas and demonstration sites for the development of the national incubator industry. Shandong Province should take the initiative to strengthen business cooperation with these places, and develop strategic incubator cooperation through joint construction and off-site incubation, so as to make developed regions advanced incubators. The development concept and mature operation model of Shandong are introduced into Shandong Province, and at the same time, it promotes the cross-regional circulation of capital, technology and talents in developed regions, promotes the transformation and upgrading of incubators in Shandong Province, and improves the overall development level of Shandong incubators.

Fourth, the government should introduce differentiated policies to guide and support different regions and different levels of incubator development. For areas where the development of incubators is relatively mature and the elements of innovation are rich, market-based means should be fully utilized, and support for incubators should be mainly in the form of rewards and post-subsidies; for areas with relatively backward development and relatively poor innovation elements, market-based means alone are not sufficient. To support the development of the local incubator industry, the government should increase early-stage policy support and guidance.

3.4 Establish a Business Incubation Service System to Improve the Quality and Efficiency of Incubation

A good business incubation service system helps incubators provide diversified services for incubating enterprises, and is conducive to the improvement of incubation quality and efficiency. Therefore, it is necessary to establish a clear technology business incubator service system model (see Figure 8). Specifically:

The first is to innovate the incubation form. Encourage a variety of investment entities from the society to enter the field of incubator construction, and each investment entity is directly responsible for the consequences of investment, promote the transformation of the business system of incubators in the direction of enterprise, and build innovative incubators and virtual incubators across the country, as they are at different stages and in different industries. Entrepreneurship projects in the field provide differentiated services to improve the efficiency and effectiveness of incubator operations.

The second is to further expand the incubation target. Incubation services will cover every stage of enterprise growth and development, ensure the effective supply of entrepreneurial incubation services, encourage entrepreneurial groups in various fields of society to devote themselves to innovation and entrepreneurship, and extend the connotation of incubation services. Using incubators as a carrier, we will vigorously cultivate leading talents in innovation and entrepreneurship and strategic emerging industries, establish overseas incubation bases, and extend the scope of incubators to foreign countries.

The third is to strengthen the construction of professional services and public platforms. At the service level, we must attach importance to basic services, strengthen value-added services, and connect with intermediary services; at the support level, we must establish government support platforms, technical support platforms, and information sharing platforms to enhance incubator service capabilities and improve the overall operational effects of incubators.

The fourth is to gradually standardize incubation services. Learn from the mature practical experience of incubators in foreign and developed regions, combine the development status of Shandong incubators, and continuously summarize their own development experience and lessons,

and further improve the operating code of conduct and incubation in terms of the growth services of incubators, the management of incubators and the quality of operation. The detailed service rules form standardized and detailed incubation service standards.

The fifth is to strengthen the training of incubator managers and entrepreneurial mentors. Support successful entrepreneurs, technical experts, industry experts and investors to serve as entrepreneurial mentors, encourage entrepreneurial mentors to invest in tutored companies, establish a mutually beneficial and win-win mechanism, guide entrepreneurial mentors to serve as incubator expert consultants, and promote industry experience exchanges.

In addition, it is necessary to improve the professionalism and professional service capabilities of incubator practitioners, gradually improve the introduction and training mechanism of incubator talents, improve the work responsibility system and code of conduct standards for incubator practitioners, and improve the management capabilities of managers.

3.5 Strengthen the Training of Professional Talents in Incubators and Establish a Team of Highly Effective Entrepreneurial Mentors

The survey found that there is a lack of professional management talents in incubators and crowd-creation spaces. On the one hand, entrepreneurial service personnel are highly mobile, and on the other hand, most of them have not received systematic training and learning, which makes most entrepreneurial service personnel unable to do well for the incubating entrepreneurs. Companies provide effective services. In the early stage of our province, only Qingdao, Zibo and other regions organized training for employees of technology business incubators. Most of the training is concentrated on a certain number of days, and there is a lack of continuous learning and training in the later period. The level of professionalism of entrepreneurial mentors is uneven, and they lack professional and high-level services, such as investment and financing, professional guidance, market resources, project promotion and other experts. They provide limited reference and suggestions to entrepreneurs and cannot provide substantive assistance.

The first is to strengthen the training of innovative and entrepreneurial talents, implement a training plan for innovative and entrepreneurial talents, organize and open trainings for employees of crowd-creation spaces and incubators every year, and conduct multi-level, systematic, and training of existing management and service personnel to improve their overall quality and Business level, forming a high-level, high-quality, professional and professional entrepreneurial incubation talent team, while strengthening the supervision and evaluation of follow-up support services and training quality.

The second is to select and form a team of high-quality and efficient entrepreneurial mentors. Governments at all levels in Shandong Province should listen to opinions from many parties when formulating management measures for entrepreneurial mentors. They should be encouraged to become entrepreneurial mentors with diverse qualifications. For industry experts and industry pioneers, they should be encouraged to become entrepreneurial mentors. During certification, they should be Incentives, while continuously improving access qualifications, strengthening the performance appraisal of hiring mentors, and thus creating a high-quality and efficient team of entrepreneurial mentors.

3.6 Strengthen Policy Publicity, Enhance the Atmosphere of Innovation and Innovation, and Break Down Information Barriers and Institutional Barriers

At present, a large number of supportive policies for entrepreneurship and innovation have been issued throughout Shandong, but due to various reasons such as limited policy propaganda methods, many incubators cannot receive relevant policy information in the first time. Due to the lack of

professional policy interpretation, everyone has inexhaustible interpretation of the policy. same. There are many reasons why entrepreneurs cannot obtain relevant information in a timely manner, or they miss the opportunity to declare the policy due to incorrect interpretation of the policy.

The first is to regularly hold multi-level and all-round entrepreneurial incubation activities to create an atmosphere of innovation and entrepreneurship for the whole people. Encourage scientific research personnel, university students, and enterprise talents to devote themselves to innovation and entrepreneurship activities, adopt diversified incentive policies, encourage entrepreneurs in various industries to establish various types of entrepreneurial enterprises, and support incubators to organize and carry out China Innovation and Entrepreneurship Competition, “Internet + “College Student Innovation and Entrepreneurship Competition” and “Creating Youth” National College Student Entrepreneurship Competition and other entrepreneurial competitions, to stimulate the enthusiasm for innovation and entrepreneurship of college students and the general public, to showcase the achievements of college innovation and entrepreneurship education and enterprise innovation technology, through the competition platform, select one A large number of outstanding innovation and entrepreneurship projects, and attract investors from various fields to invest in outstanding projects, build a docking platform for innovation and entrepreneurship projects and social investment, and cultivate a group of entrepreneurs who are brave to innovate, work hard and enterprising. Establish an entrepreneurial incubator brand, build a batch of national excellent incubator brands, and play a demonstrative and leading role in the whole society. Vigorously promote the culture of innovation and entrepreneurship, create an entrepreneurial atmosphere that is brave to innovate and tolerant of failure, and actively advocates the good trend of “mass entrepreneurship and innovation”.

Second, the government should establish a docking and exchange mechanism for scientific and technological information resources and standardized information resources, establish an evaluation and evaluation mechanism and incentive mechanism for the transformation of scientific and technological achievements into technical standards, promote the transformation and application of scientific and technological achievements, and promote the co-construction and sharing of scientific and technological and standardized resources. The results of the plan are transformed into standards to provide impetus. Technological business incubators should, based on the characteristics and advantages of the incubating enterprises, pay attention to the research of methods for transforming scientific and technological achievements into technical standards, and to cultivate scientific and technological talents, actively carry out the pilot projects of transforming scientific and technological achievements into technical standards, and promote the coordinated development of scientific and technological research and development, standard development and industrial upgrading. Provide technical support for innovative research and development.

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References

- [1] Hu Haiyan, Duan Shaofen, Pei Xinyong, et al. *The status quo, characteristics and trends of the development of incubators in my country* [J]. *Science and Technology Progress and Policy*, 2002, 10: 191-193.
- [2] Lu Gang, Du Li, Huang Yaya, Chen Weihua. *Thoughts on Promoting the 4.0 Model of Technological Business Incubator Development*[J]. *Science and Technology Management Research*, 2017, 37(17): 162-166.
- [3] Xu Tao, Li Lu. *Innovative work ideas for technology business incubators based on the triple helix theory*[J]. *Scientific Management Research*, 2015, 33(02): 1-4.

[4] Torch High-tech Industry Development Center, Ministry of Science and Technology. 2019 China Torch Statistical Yearbook [M]. Beijing: China Statistics Press, 2019.11: 56-58.