ISSN: 2688-9323

Research on Strategies of Scientific and Technological Innovation Promotion in Chengdu

Qing Jia, Xin Wen*, Min Pang, Shan Qiu and Xingmeng Yuan

School of Economics and management, Southwest Petroleum University, Chengdu, 610500, China

Abstract

Under the guidance of the "Four Comprehensives" strategy, Chengdu issued the Regulations on the Construction of Chengdu Science and Technology Center, to innovate the development mode of science and technology innovation and build a collaborative innovation platform, achieving initial results in innovative city governance and transformation of science and technology innovation achievements. However, there is still a certain gap between Chengdu and the leading city of science and technology innovation, and there are many problems in the development of science and technology innovation, such as poor guidance of macro policies and insufficient activity of enterprises. Therefore, this paper investigates the current situation of the development of science and technology innovation in Chengdu. The advantages and related problems of the development of science and technology innovation are put forward. We discusses the relevant measures to promote the development of science and technology innovation in Chengdu and help Chengdu start a new journey of innovative city development.

Keywords

Chengdu; Scientific and Technological Innovation; Status Quo; Promotion Strategy.

1. Introduction

The new round of scientific and technological revolution is an extensive and profound change, and the knowledge economy has put forward new and higher requirements for scientific research technology and talents. Scientific and technological innovation and knowledge progress provide a solid foundation and inexhaustible power for the development of urban economy and society. As the core city of Chengdu-Chongqing economic circle, Chengdu is endowed with the major task of creating a leading benchmark of science and technology, promoting the development of science and technology in Sichuan-Chongqing economic circle, and building a scientific and technological innovation center radiating to the whole country. Therefore, based on Chengdu's own regional characteristics and opportunities and challenges, it is of great significance to study the realization path of its scientific and technological innovation.

2. Analysis of the Current Situation of Sci-Tech Innovation in Chengdu based on SWOT

2.1. Advantages of Chengdu's Scientific and Technological Innovation and Development

In recent years, Chengdu has made major breakthroughs in scientific and technological innovation, which achieved a series of significant achievements by building itself into a scientific and technological innovation center with international influence and implemented

ISSN: 2688-9323

the major strategic deployment of the Chengdu-Chongqing regional economic circle by the CPC Central Committee. The basic advantages of Chengdu are as follows:

(1) Regional advantages

On February 25, 2021, the Ministry of Technology issued the Implementation Opinions on Increasing Scientific Research and Promoting the Large-scale Development of Central and Western China into a New Layout in the New Era, and put forward specific implementation plans for the Directives of the CPC Central Committee and The State Council on Promoting the Large-scale Development of Central and Western China into a New Layout in the New Situation in 2020. It will be implemented in relevant regions as a "roadmap" for science and technology development in the implementation plan of the new development of central and western China. In this report of less than 4,000 words, there are nearly 20 articles related to sichuan's enterprises, investment, industry and policy. Among them, the construction of Chengdu-Chongqing scientific development has been placed in the first place. Under the background of China's accelerating construction of an innovative country and a world power in science and technology, Sichuan and Chongqing are endowed with the historical mission of building a national influential science and technology innovation center, which brings new opportunities for Chengdu to create the core driving force of high-quality development and the development of science and technology.

(2) Infrastructure advantages

Large scientific installations and major scientific facilities are important sources of scientific research and innovation in China, which are also a huge engine for promoting the development of basic innovation in China's cities. On June 7, 2021, the Western (Chengdu) Science City was officially established, providing a major platform and development facilities for the construction of "one nuclear and four zones". The huge blue cube building stands out in the Luxi Wisdom Valley core of Chengdu Yintai Resources Holdings, the hub of the Chengdu Supercomputer, China's "strongest urban brain". Centering on technological innovation, Chengdu Supercomputer Center pays special attention to the innovative application of "supercomputer +", which provides a strong guarantee to support industry development and intelligent management business. For example, China has conducted testing and commercial cooperation with 43 clean energy companies, including the State Grid, to help achieve carbon neutrality. In the field of medical rehabilitation application, we have carried out research cooperation with 25 pharmaceutical enterprises including West China Medical Co., LTD.

In addition to the distribution of large-scale scientific facilities in Rong, "national brand" laboratories are gradually gathered in Rong. It is not only the "core foundation" for the construction of the most vigorous innovative ecosystem in Chengdu, but also an important central city advantage for the implementation of the innovation-driven development strategy in Chengdu, which is of great significance for the construction of the science and technology innovation center in Chengdu.

(3) Industrialization advantage

In 2020, Chengdu was again selected as the most attractive city in the eyes of foreign talents. By encouraging more high-quality science and technology talents to settle down in Chengdu, we will promote the balanced and coordinated development of "science and technology R&D + industrialization" in Chengdu and firmly establish its development advantages. China is a global manufacturing power, and technological innovation in manufacturing industry is the most important part of technological innovation. Compared with Beijing, Shanghai and other cities with intensive development of financial and Internet industries, Chengdu has a larger proportion of real economy, a more friendly environment for the development of manufacturing industry, and a higher efficiency of local transformation of new technologies, which is more suitable for the development of technology-oriented entrepreneurial enterprises.

ISSN: 2688-9323

Compared with newly developed manufacturing cities such as Shenzhen and Suzhou, Chengdu has unique advantages in national scientific research strength, education and medical resources, which is conducive to breeding major original scientific research achievements. Compared with other national central cities rich in cultural and educational resources, Chengdu's industrial system is more complete, which is conducive to accelerating the efficiency of r&d and production cycle and guiding the gradual upgrading of the industry.

2.2. Deficiencies of Chengdu's Promotion of Scientific and Technological Innovation

(1) The gap of scientific and technological talents

According to the International Science and Technology Innovation Center Index released in 2021, Chengdu ranks 41st in terms of science and technology human resources, which is not ideal compared with the city size and the total economic volume of the city. In terms of total quantity, the number of active researchers and the total number of published research papers in Chengdu are both over 100,000, ranking the top of the evaluated cities. However, in terms of relative quantity, there is a large shortage of scientific research talents in Chengdu, and both quantity and quality need to be improved.

(2) Lack of innovation ability

Chengdu ranked 36th in the "innovation highland" ranking, which reflects a city's innovation technology capability and the vitality of innovative enterprises. This index mainly studies IC and AI two fields. Chengdu's stock of valid invention patents in artificial intelligence (AI) and integrated circuits (IC) was 124 per million people, ranking 30th. In terms of innovation ecology, Chengdu ranks 35th. Innovation ecology reflects the degree of openness and cooperation, innovation support, public service level and innovation culture of a city. In the top 20, Beijing ranked fourth, the Guangdong-Hong Kong-Macao Greater Bay Area ranked seventh, and Shanghai ranked 10th, with Chengdu lagging far behind.

2.3. Opportunities of Chengdu‘s Promotion in Scientific and Technological Innovation

(1) Times opportunities

At present, a new round of technological revolution and industrial transformation is giving birth to new breakthroughs and opportunities, at the same time, the world's technological innovation shows new trends and features. The accelerated transformation of global technology has brought about new changes in the development of China's scientific and technological innovation, which occupies a core position in the top-level design of China's national strategy in the new period. As the national core city and national backbone city, Chengdu has great responsibility to build a national influential scientific research and entrepreneurship center. Chengdu must seize the opportunity of the new round of technological change and industrial transformation, and give play to the core guarantee function of technological innovation for the overall high-quality economic development

(2) Policy opportunities

The expansion of Chengdu-Chongqing regional economic development circle is a national development strategy, and the central government has brought the development opportunities of The Times for Chengdu to do better and stronger polar core functions. To build the technological innovation center of Chengdu-Chongqing regional twin-city economic circle, Chengdu need to give full play to its resource advantages as an innovative city in the whole province and focus on building a leading region driven by science and technology in central and western China. Chengdu also has outstanding advantages in technological innovation ability. From the innovative space layout can be seen that this feature is accelerating to highlight, increasingly progress.

ISSN: 2688-9323

2.4. Challenges of Technological Innovation

The shortcomings that Chengdu needs to make up include the size of urban economy, innovation capacity and open platform. Especially compared with coastal cities, the GDP of Chengdu was only 45.8 percent of That of Shanghai, 64.0 percent of that of Shenzhen and 70.8 percent of that of Guangzhou in 2020, showing a larger gap in per capita GDP. In the field of investment in innovation strategy, the investment intensity of total R&D expenditure in Chengdu is only 2.8% in 2020, while that in Shanghai and Shenzhen is 4.1% and 4.9% respectively. In terms of output, there is still a big gap between Chengdu and Shanghai and Shenzhen in the number of patent applications and international invention patent applications and grants. In terms of open platform construction, in 2020, Chengdu has a total of 9 high-level open platforms, a significant gap with Shanghai (22) and Shenzhen (18), and the support of open platforms still needs to be further consolidated.

3. Targets of Scientific and Technological Innovation

3.1. The Guiding Ideology of Scientific and Technological Innovation

We will speed up the construction of an important national innovation source and an innovative city with international influence, building a park city demonstration area to serve the new development concept. At the same time, an important growth pole and new power source are created to drive the high-quality development of the country, and form an innovation source to serve the construction of the strategic rear area.

3.2. The Target Planning of Scientific and Technological Innovation Target

The main task of scientific and technological innovation in Chengdu is short - term task and long - term goal. Its short-term task is: by 2025, it will be initially built into a science and technology innovation center with national influence, its core functions will be basically formed, and it will rank among the top innovative cities in China. The long-term goal is to build China into a science and technology innovation center with national influence by 2035 and become the science and technology innovation hub of the Belt and Road Initiative.

The realization of short-term tasks is mainly reflected in four aspects: first, the original innovation ability is significantly enhanced to create a new height of innovation strategy; Second, the level of technological research has been significantly improved, and new heights of technological leadership have been created. Third, the modern industrial system takes shape to create a new highland for industrial innovation; Fourth, the construction of innovation ecology will be further promoted to create a new highland of collaborative factors.

4. Advanced Experience in Urban Scientific and Technological Innovation at Home and Abroad

4.1. Enlightenment of Foreign Scientific and Technological Innovation

Taking the opportunity of seizing the scientific and technological development under the new normal, taking the upgrading of high-tech industry as the starting point, taking the cooperation between government and manufacturers as the form, and taking the training of high-tech talents as the means, foreign advanced scientific and technological innovation countries have formed their own distinctive development formats in each country. The specific implementation measures are as follows:

(1) Formulate strategic plans in line with national development characteristics; The US has formulated a New Strategy for American Innovation, which sets out clear plans in nine strategic areas. The German Government issued the German High-tech Strategy 2020, which proposed innovative solutions in different fields, and the British Government published Our Growth Plan:

ISSN: 2688-9323

Science and Innovation sets out development requirements for eight major fields with competitive advantages and development values, including big data, energy-efficient computing, robotics and autonomous systems. The European Union has put forward the "Europe 2030 Strategy", which sets out the direction and strategic goals for development in many areas. The practice shows that the leading strategic foresight plays an important guiding role in the development of forward-looking science and technology innovation, and can effectively promote the development of science and technology innovation.

(2) Igorously introduce and train scientific and technological talents; Japan attaches importance to the "adoption" of Western technology, focuses on cultivating local scientific and technological talents, encourages them to digest and innovate western technology, and develops a scientific and technological innovation path suitable for its national conditions. Tel Aviv, Israel, offers free innovation and entrepreneurship consulting services, which provide government-level support and training for talents with technological innovation ideas. The United States has made full use of its talent cultivation mechanism and welfare benefits to attract scientific and technological talents from around the world, focusing on cultivating domestic talents for high-tech industries. Germany attaches great importance to the cultivation of technical talents and has cultivated a large number of medium and high technical talents in order to maintain its advantages as an industrial power. Human resources are the foundation of a strong country. Paying attention to human resources will help countries maintain their long-term competitive edge and continue to produce scientific and technological achievements.

(3) Hing mechanisms for national consultation and public-private cooperation; The EU has set up a policy laboratory between countries to conduct forward-looking design and methodological evaluation of science and technology policy issues at the level of the alliance, aiming to create a national integration of science and technology policy derivative channels. Oulu Innovation Alliance attaches great importance to public participation in the innovation process and carries out PPP application to greatly improve the probability of success of innovation. Facts in various countries show that without mass participation in scientific and technological innovation, it will be water without a source and a tree without roots. Only by incorporating social innovation vitality into the development path of scientific and technological innovation can we achieve a better breakthrough in innovative achievements.

4.2. Enlightenment of Domestic Scientific and Technological Innovation

Under the background of national high-quality development, China's major cities have been promoting the process of innovation and reform, trying to establish innovative urban construction roads in line with their own characteristics.

Nanjing (rich in resources of science and technology type) issued "Nanjing Municipal Action Plan for Promoting Scientific and Technological Innovation, Promoting Industrial Transformation and Developing Innovative Economy. Relying on the advantages of scientific research resources, the "special community for science and technology Entrepreneurship" and the state key laboratory project will be built.Besides, It has paid attention to the cultivation of scientific and technological innovation models with its own urban characteristics, and achieved major scientific and technological achievements such as a data analysis system for 5G networks and an operating system for programmable switching equipment.

Through the construction of independent innovation plaza, Suzhou (active industry and innovation) takes a multi-faceted approach to create the "five platforms and one center" project serving scientific and technological innovation, providing practical guarantee for scientific and technological innovation. Suzhou also pays attention to the protection and cultivation of talents, and has set up talent apartments, training bases and other service facilities, which has achieved initial results in the introduction of talents.

ISSN: 2688-9323

Shenzhen (industrial technology innovative) depends on the area within the scope of the innovation leader and adheres to market-oriented development direction and enterprises centered kechuang system construction. Each year, more than 30 percent of the government's special funds for science and technology will be allocated to basic research, which provides stable research funding support for the city's colleges and universities, and greatly consolidates its own industrial innovation achievements.

5. Countermeasures to Promote Scientific and Technological Innovation in Chengdu

5.1. Optimize the Layout of Innovation and Build the Regional Core Innovation Pole

The prerequisite for the systematic construction of innovation layout lies in the comprehensive internal and external analysis and the choice of development strategy.The key task is to find the strength point and implementation direction of the innovation direction. Creating the consciousness of innovation and development of the whole society and a good atmosphere for innovation construction is necessary condition. the core element is to carry out the work of systematic planning and layout.

We will establish mechanisms for the commercialization of innovative achievements and the introduction and training of talents. First, Chengdu should rely on its national high-tech Industrial Development Zone and Western (Chengdu) Science City to carry out key construction, strengthen the overall planning and coordination of the layout of Tianfu New Area, suburban new innovation zone and other special technological innovation areas. Second, develop The Chengdu Supercomputing Center and the facility for bio-therapy and translational medicine. Third, continue to build electronic information, automobile manufacturing, equipment manufacturing, biomedicine and other traditional competitive industries.Fourth, We will deepen cooperation with universities and scientific research institutions in the city, strengthen connectivity cooperation with Chongqing and other regional cities, and build international exchange and cooperation platforms and co-create sectors, achieving coordination and orderly, internal and external integration, complementary advantages.

5.2. Develop High-Tech Enterprises and Establish the Main Force of Regional Innovation

Enterprises are the creators of social wealth, circulators of economic operation, participants of market activities and guarantors of achievement transformation. To promote scientific and technological innovation and progress, we must attach importance to the prominent role of enterprises. Chengdu should focus on identifying the leading enterprises, guiding the progress of industry of science and technology has significant growth of the value of the emerging enterprises, and to maintain the traditional industry advantage of pillar enterprises and advanced enterprises in line with science and technology innovation policy, giving preferential threshold access and development direction guidance, so that enterprises can fully realize the development opportunities and favorable situation in the field of scientific and technological innovation, and consciously invest in the industry layout and innovation work.

In terms of industrial integration, it is encouraged to set up enterprise cooperation network and internal supply and demand chain management mechanism to achieve unified industrial layout. In terms of enterprise financing, an online financial information sharing service platform integrating various financial institutions and science and innovation enterprises can be established to realize the synchronous connection between enterprise credit risk financing needs and policy information, so as to meet the capital needs of science and innovation enterprises. At the same time, it provides comprehensive service functions such as audit service,

ISSN: 2688-9323

asset evaluation, enterprise strategy consultation, policy interpretation, etc., to guarantee the needs of sustainable development of enterprises in various stages. In terms of policy support, enterprises should be given certain financial policy preferences and government subsidies in terms of capital, land, property rights, taxation, etc., to accelerate the integration of government and business, and jointly develop high-tech industries. In terms of the transformation of achievements, we should do a good job of the "middleman" between enterprises and scientific research institutions, connect and promote the deep cooperation between Sichuan universities and scientific research institutions and industrial companies, so as to push scientific and technological innovation achievements into the market faster and improve operation efficiency.

5.3. Publicize Innovative Culture and Carry Forward the Theme of Strengthening the City Through Science and Technology

Scientific and technological productivity is the root of scientific and technological development, and scientific and technological innovation culture is the soul of scientific and technological development. In order to further promote the progress of science and technology innovation in Chengdu, on the one hand, we need to continue to strengthen the propaganda of science and technology innovation culture, carry forward the innovation culture, and play the sound of strengthening the city with science and technology; On the other hand, enterprises, government and society as the main body, to stimulate the vitality of scientific and technological innovation as the guidance. The specific implementation is as follows:

One: preaching the need for technological innovation. To fully explain to the main body of scientific and technological innovation why, why can, why urgent, so that they have a deeper understanding of scientific and technological innovation for enterprises and the society to bring profound changes and great role, so as to more deeply into the wave of scientific and technological innovation.

The second is to promote the adequacy of scientific and technological innovation. The huge dividends and innovation opportunities of Chengdu in deepening reform and opening up and the support of the state and government for scientific and technological innovation should be fully publicized to all subjects. Make them realize the mature condition and sufficient guarantee of current Chengdu science and technology innovation, establish firm confidence in the success of science and technology innovation.

Third: publicize the future of scientific and technological innovation. We should fully emphasize to each subject the enormous role and remarkable results brought about by the success of scientific and technological innovation, make them more convinced that the future of scientific and technological innovation is bright and the road is broad, and provide them with broader spiritual source and stronger spiritual motivation.

5.4. Accelerate Talent Recruitment and Development, and Build New Forces for Innovative Development

Talents are the core competitiveness of Chengdu's scientific and technological innovation and development and the basic force of scientific and technological productivity creation. The construction of talents in Chengdu should be carried out both in terms of talent introduction and talent cultivation. In terms of talent introduction, we should continue to carry out the policy of talent diversion, give preferential treatment to scientific and technological talents in settling down, work and other aspects, attract innovative talents and cutting-edge talents to settle down, improve the structure and efficiency of talent introduction; In the aspect of talent cultivation, we should rely on the real universities in Chengdu, further improve the university education system, enhance the strength of the universities, and increase the training of comprehensive scientific and technological talents. It is necessary to systematically build comprehensive science and technology and finance personnel training organizations, integrate high-quality

ISSN: 2688-9323

talent resources in various fields, and accelerate the gathering of science and technology innovation talents based on the cooperation and exchange of high-end composite talents. It is necessary to carry out the cultivation and education of talents, promote the training of talents on probation, and develop the channels of application and practice of theoretical talents and theoretical learning of applied talents, so that they can learn from each other and merge their advantages. The talent pool should be established to encourage talents to learn and improve themselves. The innovation ability of talents should be developed by encouraging mechanism of talent training.

5.5. Intensify Opening-up and Jointly Build Chengdu Science and Innovation City

The breadth of scientific and technological innovation lies in the multi-level exchange and interaction with various fields, so as to produce synergistic effect and realize complementary advantages. Chengdu should deepen the exchange and cooperation with Chongqing and other regional cities, seize the strategic opportunities of Chengdu-Chongqing integration and western development, build a comprehensive scientific and technological innovation platform, and improve the overall innovation vitality of the region. We should rely on the national high-tech Industrial Development Zone and the western Science City (Chengdu) to attract the world's top 500 enterprises to invest and set up research centers, and do a good job in the mutual advancement of science and technology. Deeply committed to carry out the construction plan of the "difference" international foreign communication center ", around the software engineering, biomedical and other core competitive industries, engage in the United States, Japan and other advantages to compete further cooperative development of the country, to build international open garden, international cooperation of science and technology demonstration base and other key platform, with normative engineering of "introduction to walk out" to foster international cooperation on science and education.

Acknowledgments

Foundation Item:2021 National College Students' Innovation and Entrepreneurship Training Program Project "Research on the Model Construction and Mechanism of Scientific and Technological Innovation and Technological Finance Collaborative Development -- A Case study of Chengdu"(S202110615037).

References

[1] Leonid Kogan,Dimitris Papanikolaou. Technological Innovation, Intangible Capital, and Asset Prices [J]. Annual Review of Financial Economics,2019,11(1).

[2] Science and technological innovation as a strategic opportunity for solving problems with quality[J]. Revista de Ciencias MÃ©dicas de Pinar del RÃo,2019,23(4).

[3] Fortune Ganda. The impact of innovation and technology investments on carbon emissions in selected organisation for economic Co-operation and development countries[J]. Journal of Cleaner Production,2019,217.

[4] Jilu Liu,Lifei Pei,Zhiyu Zhang. Research on the Evaluation Index System of Technological Innovation of Technology-Based SMEs[J]. International Journal of Frontiers in Sociology,2020,2.0(9.0).

[5] Guangyuan Zhang,Min Wang. The Measurement and Spatial Analysis of Shaanxi Province's Technological Innovation[J]. Industrial Engineering and Innovation Management,2021,4(3).

[6] Li Ziyang,Shi Hongwei,Liu Hongda. Research on the concentration, potential and mission of science and technology innovation in China.[J]. PloS one,2021,16(10).

[7] Tian Ye,Hu Xiaobing. SWOT Analysis of China's Ceramic Industry and the Use of Computers for Scientific and Technological Innovation Research[J]. SCIENTIFIC PROGRAMMING,2021,2021.

ISSN: 2688-9323

[8] Ding Chenhui,Liu Chao,Zheng Chuiyong,Li Feng. Digital Economy, Technological Innovation and High-Quality Economic Development: Based on Spatial Effect and Mediation Effect[J]. Sustainability, 2021, 14(1).

[9] Zhenbang Ma. Evaluation and Coupling Analysis of Scientific and Technological Innovation and High-Quality Economic Development in Gansu Province[J]. World Scientific Research Journal, 2022, 8(8).

[10] Wang Jinglei,Ma Xiao,Zhao Yixuan,Zhao Jing,Heydari Mohammad. Impact of scientific and technological innovation policies on innovation efficiency of high-technology industrial parks – A dual analysis with linear regression and QCA[J]. International Journal of Innovation Studies, 2022, 6 (3).

[11] Shi Zhn, Wu Yingju, Chiu Yung-ho et al. Research on the influence of technological innovation and technological application: Evidence from China[J] Journal of Engineering and Technology Management, 2022, 63.