

Assessment of Jiangxi regional innovation system construction



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Jiangxi, a less developed province in central China, with insufficient talents, serious insufficiency of scientific investment, relatively vulnerable in scientific innovation capability. Incompletion of function and imperfection of mechanism in self-innovation in the enterprises-centered system; Further improvement is in need in the integration mechanism and innovation environment of innovation system. Hence, constructing the Jiangxi regional innovation system is the strategic choice of accelerating the economic and social development, boosting the industrialization process, facilitating the optimization and upgrading of industrial structure as well as advancing regional competitiveness.

1. Basic situation of Jiangxi regional innovation system construction

1.1 Knowledge innovation system takes shape

1.1.1 Universities and research organizations become the fresh troops in scientific

innovation. Till the year-end of 2011, a total of 86 common colleges, 58 research organizations built by higher education institutions with 13326 scientific research personnel; A total of 12 centers for post-doctoral studies, 43 Post-Doctoral Research Centers; in the province wide, there are a total of 113 independent research institutes above the county level with 5256 scientific researchers; 31 Provincial independent research institutes with 4501 scientific and technical personnel.

1.1.2 Positive promotion for the scientific and technical basic condition terrace construction. Thus far, the total number of key laboratories of various types (including one with national level) has reached 67 while 102 engineering technical research centers (including 5 with national level) have been set up. The R&D fields of these organizations involve agriculture, food, provender, light textile, medicine, engineering and technology, humanism and society and other aspects.

1.1.3 Talent group reaches a certain size. In the year-end of 2011, the talent over the province has reached 1.7 million. Among which, 708,000 people are professional and technical personnel in various fields, 112,200 engaging in sciences and technology activities, including 52,000 scientists and engineers as well as 4 academicians.

1.1.4 Sustainable growth rate took place in patent application quantity, patent granted quantity and scientific and technological achievements. In 2011, there are 9674 patent applications, 5500 patents granted and 708 scientific and technological achievements registrations over the province, with 53.4%, 27.6% and 20.41% increase respectively compared to the same period of last year, which has created a record high.

1.2 Technology innovation system is generating for enterprises-centered system

At the end of 2011, 6481 industrial enterprises above designated size with about 240,000 employees have been established; 325 enterprise-level R&D institutions and 120 enterprise technology centers including 6 of national-level have been established; 27500 enterprise researchers, accounting for 66.0% of the province total amount which manifesting that the enterprises have gradually become the central part of innovation.

1.3 Initial formation of science and technology intermediary service system

At the end of 2011, Jiangxi possesses 7 high-tech business incubators, including 4 of national-level; 124 productivity promotion centers, including 6 of national-level; Technology market has become the tie connecting technology and economy. Initial construction has been made in four-level market system, that is, province, city, county and township. In provincial total, 2262 contracts have been clinched, which adds to 3.239 billion yuan for contract transaction amount.

1.4 Diversified scientific investment system is forming

R&D investment has basically formed a multiple-input pattern that takes government appropriation as guidance and enterprise investment as mainstay, initial involvement of financial institutions and foreign fund. In 2011, the total amount of social R&D budget was 9.675 billion yuan including 7.835 billion yuan for research use from enterprise investment, 825 million yuan from technology and research institutes and 799 million yuan from institutions of higher learning. Venture capital institutions initially started their business and by now, there are 5 venture capital institutions in Jiangxi.

1.5 Constant improvement on security system of science and technology policy

A series of policies and regulations on encouraging technological innovation, accelerating the commercialization and industrialization of research achievements have been formulated and appeared one after another in Jiangxi Province, for instance: *CPC Jiangxi Provincial Party Committee, People's Government of Jiangxi Province implementing the Views of Enforcement on Implementation of the Decision on Strengthening Technological Innovation, Developing High-tech and Realizing Industrialization, Several Opinions of Jiangxi Provincial People's Government on Energetically Implement the Strategy of Developing Jiangxi Through Science and Education and Strengthening the Province Through Talents, Management Ordinance of Jiangxi Technology Market, Ordinance of Facilitating the Commercialization of Research Findings, Jiangxi Provincial People's Government's decision to vigorously develop the Private Science and Technology Enterprises, Science and Technology Reward System of Jiangxi Province, Jiangxi Provincial People's Government's Decision on Management System Reform of Provincial Independent Scientific Research Institutes, Several Policies on promoting*

Jiangxi's Hi-tech Industry Development, Trial Procedures of Jiangxi Province-level Private Science and Technology Park Management, Trial Procedures of Subsidized Loan Management on Science and Technology Projects of Jiangxi Provincial Science and Technology Agency. The policies and regulations above will drive the continuous improvement on scientific and technological innovation environment.

2. Jiangxi regional innovation system assessment

In accordance with authoritative publishing of the National Ministry of Science and Technology, China Regional Innovation Capability index and ranking of 2011 and the statistical monitoring index and ranking on national scientific and technological progress, basic judgment on Jiangxi regional innovation system can be concluded as it's in low intermediate level in national scale (*tab. 1*).

Knowledge innovation capability includes 3 indexes: research and development investment, patent and research articles; Knowledge acquisition capacity includes 3 indexes: scientific cooperation, technology transformation and foreign direct investment; Enterprise technology innovation capacity contains 4 indexes: enterprise R&D investment, design capacity, manufacture and production capacity, revenue of new product sales; Technology innovation environment contains 5 indexes Innovation infrastructure, market demand level, workforce quality level, finance environment and entrepreneurship level; Economic benefits of innovation contains 5 indexes: macro-economy, industrial structure, international competitiveness of product, employment level, as well as sustainable development and environment protection (*tab. 2*).

Table 1. All Level Index and Ranking of Jiangxi in China Regional Innovation Capability (2011)

Index Name	Composite Indicators	Strength (subitem)	Efficiency (subitem)	Potential (subitem)	Rank
Composite value	22	20	24	6	18
Knowledge Creation	26	21	27	4	22
knowledge acquisition	25	24	18	16	21
Technological innovation abilities of enterprise	27	22	26	25	25
Technology innovation environment and management	16	22	26	29	27
Economic Benefit of Entrepreneurship	14	15	10	18	14

Data Sources: Science and technology statistical data of Jiangxi Province, 2012

Table 2. All Level Index and Ranking of Jiangxi in Statistical Monitoring of National Science and technology progress (2011)

Index name	Monitoring value	Rank
Environment of Science and Technology Progress	41.99	24
Investment of Science and Technology Activity	37.09	23
Output of Science and Technology Activity	21.84	27
High-tech Industrialization	49.15	12
Science and Technology Facilitating Economic and Social Development	57.99	28

Data Sources: Science and technology statistical data of Jiangxi Province 2012

3. Existing issues of Jiangxi regional innovation system

Weak in gross science and technology investment.

Of late years, in spite of increase in financial appropriation of science and technology in governments at all levels, the issue of insufficient gross investment is still penetrating. The proportion that provincial local financial investment in science and technology accounting for fiscal expenditure has been stagnant and is in lower level compared to other regions over the country. The proportion of research and experiment development funding accounting for GDP falls far short of the national average.

The development of the provincial science and technology financial system lags behind relatively. Science and technology venture capital, bank loans, social financing and other multi-channel tech investment system are imperfect. Due to the long-term shortage of investment in science and technology, outmoded technical equipment, underdeveloped measures, few result and lower level, which makes it hard to adapt to the needs of economic and social development in science and technology.

Less independent intellectual property rights and technological achievements.

The provincial tech strength is relatively weak, especially in the advanced technology featuring perceptiveness and intersectional nature. In the light of 2012 national statistical monitoring record, Jiangxi's 5 basic indexes including environment index of science and technology progress, science and technology activities input index, science and technology activities output index, the index of high-tech industry and science and technology for economic and social development are not only lower than the national average, but also in the lower position among the 6 China central provinces.

Lack of high-level scientific and technological innovation leading talents.

In particular, it is a serious lack of excellent academic and engineering leaders, high-tech industries leaders, knowledge-intensive management personnel and other high-level science and technology innovation talents. The number of centers for doctoral studies and enterprise postdoctoral working station is only equivalent to one key university or a city in a developed province.

The enterprise-centered technological innovation system has not been completely constructed.

Due to the inadequate reform of property, the enterprises lack initiative impetus, investment and have imperfect organization mechanism in technological innovation, which make enterprises a weak power in technological development. In the year of 2011, 34.28% technology development power is divorced from enterprises and only half of large and medium enterprises have technological development organization while the ones with organization are still weak in innovation.

Lag on the reform and innovation of science and technology system and operation mechanism.

Most of the provincial research institutes still use original operation mode, with weak economic foundation, lack of reserve personnel, independent portal with single function, making it difficult to accomplish the projects with high technical integration request. Though the research institutes have the capability of some element technics, they still show helplessness when dealing with synthesis technique claim from enterprises. Various sciences and technology intermediary's development lag behind and they do not effectively play the role in aggregation effect and service functions of scientific and technological achievements.

4. Policies and measures of Jiangxi regional innovation system construction

4.1 Vigorous implementation of the program "1368" for Jiangxi regional innovation system construction.

A. Core Program: a core program to strengthen innovation subject and form a network interactivity.

Improving the strength and size for 6 innovation subjects including enterprises, institutions of higher learning, research institutes, financial institutes, intermediary service organizations and ability of governments at all levels and forming the regional innovation mechanism and network between innovation subjects while setting innovation as the overall objective.

B. Building regional innovation system program in 3 economic regions including Nanchang city, South Central Jiangxi and West Jiangxi.

C. Building 6 regional innovation system programs, namely knowledge innovation, technology innovation, intermediary services, investment and financing, environment support and policy guarantee.

D. Building 8 characteristics innovation system programs

- pillar industries
- Innovation system program of high and new technology industry
- Innovation system program of industrial park
- Innovation system program of specialization region
- Innovation system program of the industrial cluster of Jingdezhen ceramics
- Innovation system program of military and civilian integration
- Innovation system program of agriculture
- Innovation system program of the Mountain-River-Lake Project.

4.2 Intensifying regional innovation management system

A. Establishing construction leading group to promote regional innovation system of

Jiangxi. The leading group takes responsibility for *Top-Level-Design* of the provincial regional innovation system construction, establishing policies and measures, development planning, accreditation of plan implementation, coordination of organization and implementation, etc. Leading group sets the office which can be affiliated to Jiangxi Provincial Department of Science and Technology and takes responsibility for presiding over specific jobs like coordination, monitoring, organizing and implementing, etc.

B. Establishing experts committee for regional innovation. The committee should consist of leading experts from main industries and disciplines. Also famous scholars and experts from domestic and abroad can take part in as consultants that are responsible for consulting on technology level demonstration and decisional counseling for major issues.

C. Establishing strategy and plan for scientific and major industry development. Efforts should be exerted in building technical innovation platform and integrate scientific power in whole province. This will assemble and improve the major research cooperation program of multi-industry and multi-region, aiming to direct and facilitate dynamic integration of scientific power in all directions.

D. Establishing and improving policies in scientific investment, tax, industries, talent, government procurement, intellectual property, etc.

4.3 Deepening the reform on science and technology system

On the basis of national and provincial government work deployment, the property rights system reform of research institutes conversion should be accelerated, the reform in public welfare research institutes should be comprehensively promoted. This will drive most research

institutes and scientific and technical personnel to major economic construction areas, which will make a new road closely combining science, technology with economy.

4.4 Establishing diversified investment and financing system.

Further improvement will be made in diversified scientific and technological innovation investment system with government investment in guidance, enterprise investment as mainstay, financial and venture capital as support, active absorbing social capital and bringing in foreign capital. Capital market will be utilized to promote science and education, science and industry, science and social development, science and industry development of local characteristics, science and capital, scientific development and infrastructure investors, making them a harmonious joint, combined promotion and mutual development in multiple levels.

4.5 Establishing talent support system

A. Organizing and implementing all kinds of talents programs.

B. Carrying out overseas students' entrepreneurship project.

C. Creating a good environment for entrepreneurship, innovation and talents promotion.

D. Intensifying construction of high-level talents resources.

4.6 Establishing an effective mechanism for combining production, teaching with research, and international cooperation

A. Supporting enterprises to build research institutes and engineering technology research centers.

B. Implementing industrialization projects, enhancing the industry-university-research cooperation.

C. Accelerating technical innovation progress of medium-sized and small enterprises.