

# Research on the Strategy of Improving the Technological Innovation Ability of Jiangxi Universities

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## ABSTRACT

As a member of the regional technological innovation system, enhancing colleges' technological innovation capability in Jiangxi Province can help universities play a role in transforming economic development methods and building regional innovation systems, And it is important to promote regional technological innovation capacity building. Based on the theoretical research and the results of practical exploration of universities' technological innovation capabilities at home and abroad, this paper analyzes the status and problems of the development process of colleges' technological innovation capabilities in Jiangxi Province, and then propose some improvement measures, such as, increases the investment in human resources, increases the investment in scientific research funding, and improve the funding management system, strengthen industry-university-research cooperation, improve the evaluation system of technological innovation capability and so on.

**Keywords:** *Jiangxi University, technological innovation ability, status and problem, improved strategy*

## 1. INTRODUCTION

The strength of technological innovation is an important criterion to measure the national comprehensive strength. Improving the strength of scientific and technological innovation is an important part of improving the comprehensive national power and enhancing its international voice. As an important part of the national scientific research team, universities have an important influence in improving the national technological innovation strength. As socialism with Chinese characteristics enters a new era, our education has a better environment, and education has become an inexhaustible source of national development and national rejuvenation. Jiangxi Province needs more scientific and technological strength as a supporting force to transform economic development mode and optimize industrial structure. Therefore, universities should continuously strive to improve the level of scientific and technological innovation, so that technological innovation can play fully the important role in regional economic growth.

## 2. REFERENCE FOR THEORETICAL RESEARCH AND PRACTICAL EXPLORATION OF UNIVERSITIES' SCIENTIFIC AND TECHNOLOGICAL INNOVATION ABILITY

### 2.1. Research and Exploration on the Factors Affecting Technological Innovation in Universities

Paulo and Margarida believe that the main constraints of university technological innovation include limited infrastructure and resources, lack of financial opportunities,

inadequate technical resources, and a conservative academic culture, these factors restrict regional development and highlight the necessity of higher education modernization. Some scholars are further concerned about the impact of university-centered technology transfer policies on entrepreneurship and innovation.

### 2.2. Research and exploration on the relationship between universities' technological innovation ability and economic growth

Goldstein, Bergman, and Maier compared the innovative capabilities of European and American universities in regional economic development and the output contents of universities, and they believed that universities mainly undertake eight functions, such as knowledge creation and talent training and so on. [1] Some scholars analyzed the derivative product of technical transformations of universities, which is the impact of patents and research contracts on the possibility of enterprise innovation. Some scholars tried to promote the technological innovation capability of universities by building the relationship between enterprises and universities. They believed that EP-VCist can be constructed to act as a bridge between enterprises and universities, enterprises can reduce the risks of universities' technological innovation. Enterprises and universities can obtain benefits at the same time. Some scholars have also constructed models between universities and regional economic development.

### 2.3. Research and Exploration on the Meaning of University's Technological Innovation Ability

Domestic scholars have different opinions on the scientific and technological innovation ability of universities. Scholars believe that the technological innovation

capability of universities is a kind of comprehensive ability that produces high-level technological innovation results and forms competitive advantages and innovative characteristics through effective use and allocation of resources, as well as some scientific and technological innovation activities, such as knowledge innovation, technological innovation, achievement transformation innovation, and management innovation. [2] Some scholars believe that scientific and technological innovation capability of universities is mainly composed of the three elements such as innovation foundation, innovation input and innovation output. [3]

**2.4. Research and Exploration on Promotion Strategy for Improving the Ability of Science and Technology Innovation in Universities**

Scholars put forward some improvement strategies by analyzing the technological innovation capability of regional universities, such as, universities should increase investment in science and technology, broaden funding channels, and enhance their ability to invest in science and technology innovation; enhance the awareness of innovation, strengthen team building, and enhance the basic capabilities of technological innovation; strengthen the industry-university-research cooperation, improve the evaluation system of technological innovation capabilities, and enhance the output capability of technological innovation; [4] introduce innovative talents, weaken the boundaries of chemistry disciplines, and improve the level of alliance and so on.

**3. ANALYSIS ON THE STATUS QUO OF THE INVESTMENT ABILITY OF SCIENTIFIC AND TECHNOLOGICAL INNOVATION OF UNIVERSITIES IN JIANGXI**

The investment in scientific and technological innovation of universities in Jiangxi Province is mainly analyzed from the aspects such as human resource investment ability, scientific research funding investment ability and project investment ability.

**3.1. General situation**

Nationally, the development of higher education in Jiangxi province is relatively backward, with low development level and slow development speed. According to the website of the Ministry of Education, there were 103 institutions of higher learning in Jiangxi by June 2019, including 45 undergraduate institutions, 58 junior college institutions and 8 adult institutions of higher learning. Statistics from the Ministry of Education show that by 2019, there were 2,956 institutions of higher learning in China, with Jiangxi accounting for 3.48%, ranking 12th in the number of colleges and universities among all provinces and cities in China. According to the 2017 Compilation of Statistics on Science and Technology in Institutions of Higher Learning released by the Department of Science and Technology of the Ministry of Education, PRC, there are a total of 8776 institutions of higher

learning research and development in China, among which 225 are in Jiangxi province, accounting for 2.56% of the total.

**3.2. Insufficient number of scientific researchers**

Human resources are of great significance for enhancing the technological innovation capabilities of universities. Research manpower input includes full-time equivalent personnel, scientists and engineers, and general research and development personnel. Here is an analysis of the statistical data of the research and development personnel of the universities in the "2014-2017 Science and Technology Statistical Data Collection of Colleges and Universities". [5] The specific situation is shown in the following table.

Table 1 2014~2017 Jiangxi Province research and development personnel accounted for the proportion of the country

years	Number of universities in the country	Number of national research and development personnel	Number of research and development personnel in Jiangxi Province	Proportion of research and development personnel in Jiangxi Province (%)
2014	1071	359884	5257	1.46
2015	1146	369510	6223	1.68
2016	1497	381102	6843	1.80
2017	1805	391102	7024	1.80

As shown in the figure, the number of research and development personnel in Jiangxi Province increased year by year from 2014 to 2017, which indicates that more and more teachers or other personnel are engaged in the research team. From 2014 to 2017, the proportion of research and development personnel in colleges and universities in Jiangxi Province accounted for 1.46%, 1.68%, 1.80%, and 1.80%, respectively, showing an upward trend year by year. From 2014 to 2017, the number of research and development personnel in colleges and universities in Jiangxi Province accounted for 24, 20, 21, and 22 in the national rankings respectively, and the ranking was stable at about 20, which is located in the middle and lower reaches of the country. From 2014 to 2017, Jiangxi Province's R&D achievement application and technology service personnel accounted for 2.21%, 1.85%, 1.98%, and 2.14% of the country respectively. This data is basically stable at about 2%.

**3.3. Insufficient research fund**

In recent years, China has continuously increased its investment in science and technology. According to the "Statistical Bulletin of National Science and Technology Expenditures in 2018", in 2018, national research and experimental development (R&D) expenditure totaled 1967.79 billion, an increase of 207.18 billion or 11.8% over 2017. This article compares the scientific research funding input of colleges and universities based on internal expenditure of science and technology funds in the current year. The three universities with the highest internal

expenditures of science and technology funds in Jiangxi province in the current year were East China University of Technology, Nanchang Hangkong University, and East China Jiaotong University, with funding of 146914 thousand, 115734 thousand, and 114008 thousand respectively. The science and technology expenditures of the top three universities accounted for 40.7% of the 34 universities in Jiangxi Province in 2017, resources are concentrated in the hands of a few universities. Nationally, the funding of Peking University is 2 222 470 thousand yuan in 2017, this data far exceeds the total of 34 universities in Jiangxi province. The shortage of scientific research funds has led the slow development of higher education and the low quality of education in Jiangxi province.

### **3.4. Low research ability**

Universities in Jiangxi province have a large gap in the number of scientific researchers. About the number of personnel invested in the project in 2017, Jiangxi University of Traditional Chinese Medicine, Nanchang Hangkong University, and East China University of Science and Technology are among the top three, with 441, 357, and 317 respectively. Due to the serious shortage of scientific research personnel, universities in Jiangxi province lag behind in scientific research strength and make slow progress. Nationally, the total input of scientific research personnel in universities in Jiangxi province is still insufficient, for example, the number of personnel invested in the project of Peking University in 2017 was 4807, this data is 11 times that of Jiangxi University of Traditional Chinese Medicine.

## **4. ANALYSIS ON THE STATUS QUO OF THE OUTPUT ABILITY OF SCIENTIFIC AND TECHNOLOGICAL INNOVATION OF UNIVERSITIES IN JIANGXI**

As far as the province is concerned, there is a big gap in the output capacity of scientific and technological innovation of colleges and universities in Jiangxi province, and the development level of the overall scientific and technological innovation capacity of universities in Jiangxi province is low, falling behind those in developed regions. In 2017, the number of monographs from 34 universities in Jiangxi Province totaled 65, while the number of monographs from Peking University was 56; the number of technology transfers and signed contracts of 34 universities in Jiangxi Province totaled 44, while Peking University's number of indicators was 42. So, we can believe that the overall development level of scientific and technological innovation capabilities of universities in Jiangxi Province is still backward. From the province, the top three universities in the number of technology transfers and signed contracts are Gannan Normal University, East China Jiaotong University, and Jiangxi University of Science and Technology, with 9, 8, and 8 respectively. In general, the technological innovation output capacity of universities in Jiangxi province is relatively low, and there is a large gap between universities in Jiangxi province and key universities.

## **5. PROMOTION STRATEGY OF SCIENCE AND TECHNOLOGY INNOVATION ABILITY OF UNIVERSITIES IN JIANGXI PROVINCE**

### **5.1. Increase investment in human resources**

Human resources play an significant role in improving the scientific and technological innovation capabilities of universities. Local governments should increase investment in human resources and formulate preferential policies to attract a large number of talents and technical resources. At the same time, universities should establish a reasonable promotion mechanism and formulate some reward policies, in order to attract or encourage technological innovation talents in universities to conduct scientific research activities, and universities and governments should issue corresponding policies to prevent the brain drain.

### **5.2. Increase investment in technology funding**

The investment of technology funding plays an important role to improve the scientific and technological innovation capabilities of universities. The government should increase investment in education funds, encourage schools to establish funds and school-run enterprises. At the same time, education investment channels should be broadened, schools should actively expand education funding through school-enterprise cooperation, attracting enterprise investment, and sharing scientific research results with enterprises. Through these measures to consolidate the important material foundation for the improvement of educational and scientific research capabilities, and improve the fundamental driving force for the scientific and technological innovation capabilities of universities

### **5.3. Improve the funding management system**

The management of scientific research funds is also an important content in scientific and technological innovation activities. The effective management and distribution of scientific research funds have an important influence on implementing scientific research activities and enhancing scientific research capabilities. Research funding of universities comes from various channels, such as government investment and corporate donations. In order to effectively manage it, a fair and open evaluation system should be formulated, carry out reasonable evaluation on various funds evaluation indexes to ensure the reasonable allocation of funds in personnel, equipment and other aspects. Governments and universities should conduct a reasonable evaluation of the allocation of funds to ensure a reasonable allocation of funds in various aspects such as personnel and equipment. At the same time, the accountability mechanism will be improved, the responsibilities will be accurate to the individual, and their responsibilities will be investigated in accordance with the law to ensure that the investment of funds can achieve the greatest benefit.

#### **5.4. Strengthen industry-university-research cooperation**

The government should make specific analysis of specific problems for universities, continue to increase investment in universities with large resources and strong capabilities, and fully tap potential scientific research capabilities; universities with poor scientific research capabilities should conduct in-depth analysis and prescribe the right medicine. The government should formulate comprehensive policies to encourage universities and enterprises to realize the integration of production, education and research, and use market means to promote the combination of scientific research teams of universities and the financial strength of enterprises, and the combination of manpower and material resources. Provide enterprises with cutting-edge scientific and technological achievements while enhancing the scientific and technological innovation capabilities of universities. On the part of universities, they should actively seek corporate cooperation, strive for corporate funds and scientific research equipment, and at the same time do a good job in docking with the corporate scientific research results to ensure that both parties achieve a win-win situation in cooperation. Enterprises should fully understand their own advantages, increase investment to maximize benefits. At the same time, they should strengthen inter-school cooperation, learn the advantages from other universities, learn from each other's strengths, make up for their own shortcomings, and continuously improve their own comprehensive strength in technological innovation.

#### **5.5. Improve the evaluation mechanism of technological innovation capability**

On the one hand, it is necessary to establish a scientific and effective evaluation mechanism for technological innovation capabilities. In order to prevent university teachers from producing a large number of worthless research results, a reasonable evaluation system should focus on the quality and level of scientific research results, and universities should encourage teachers and researchers to conduct high-quality, high-level scientific research; on the other hand, the assessment should be fair. Fairness are the basic motivation to promote high-quality scientific research in universities, the fairness and fairness of the scientific research results of scientific researchers can ensure the enthusiasm and motivation of scientific researchers.

### **6. CONCLUSION**

Colleges play an significant influence in promoting the industrialization of high-tech, the transformation of achievements, and the cultivation of innovative and entrepreneurial talents. As a relatively backward province in central my country, Jiangxi Province has obvious shortcomings in technological innovation. Therefore, improving the technological innovation strength of universities is of great significance to changing the status quo of regional technological innovation capacity building. In order to change the status quo of technological innovation capabilities of universities in Jiangxi Province, it is necessary to increase technological human input,

increase investment in science and technology funds, improve the funding management system, strengthen cooperation between industry, university and research, and improve the evaluation mechanism of technological innovation capabilities to further improve the technological innovation capabilities of Jiangxi universities.

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### **REFERENCES**

- [1] Goldstein, Harvey; Bergman, Edward; Maier, Gunther. Regional Engagement or Knowledge Commercialization? A Comparison of University Faculty Norms in the U.S. and Europe[J]. *Studies in Regional Science*. 2013,Vol.43(No.1): 25-45.
- [2] Lei Yanan, Chen Anquan, Hou Yawen. Comprehensive evaluation and analysis of regional universities' science and technology innovation capabilities[J]. *Science and Technology of Chinese Universities*, 2018, (06): 64-66.
- [3] Cai Wangang, Zheng Jianguo. A comparative study on the evaluation of scientific and technological innovation capabilities of colleges and universities[J]. *Social Scientist*, 2019, (10): 49-53+59.
- [4] Feng Yingjuan and Weng Na. Study on the Evaluation and Improvement Countermeasures of Science and Technology Innovation Ability of Universities in Jilin Province[J]. *Journal of Changchun University of Science and Technology*, 2012, 7(11): 39-41+58.
- [5] Department of Science and Technology of the Ministry of Education of the People's Republic of China. A compilation of scientific and technological statistics of higher education institutions in 2017 [EB/OL]. 2018.