

# Research on Technology Management Innovation and Technology System Reform of Hubei Province of china

Zhang Lan

Department of Science and Technology, Government of Hubei Province,  
Wuhan, P.R.China, 430071  
(E-mail: zhangl@hbstd.gov.cn )

**Abstract:** Technology system reform is the important motivation for technology management innovation and technology development. In the first ten years of the 21st century, China Hubei Provincial Party Committee and government adopted a series of measures to accelerate the development of technology management innovation and technology system reform, to advance the release of technology NO.1 productive force, and got striking achievements and precious experiences. This paper summarizes China Hubei province's measures and achievements comprehensively, and analyzes problems in technology management innovation and technology system reform in Hubei province existing now, and puts forward countermeasure and suggestion to improve technology management innovation and technology system reform.

**Key words:** Innovation; Technology system reform; Hubei province of China

## 1 Introduction

Technology management innovation is a process depending on features of science and technology activities, through constant realizing of science and technology activity and its external environment, perfecting and rebuilding science technology management system, to help it adjusting and improving science and technology activities better. Science and technology management innovation and sustainable development includes three parts: firstly, building science and technology management innovation system, achievements transferring system; secondly, the highest standard is adjusting the relationship between human beings and the nature; thirdly, the sustainable development of science and technology innovation should identical with the sustainable development of economy and science<sup>[1]</sup>. Lv Xiumei, Xue Zhansheng, Yu Jihai(2004) summarized the features of science and technology management innovation in new period as: firstly, science and technology activities are more flexible; secondly, it's difficult to evaluate and measure the output of science and technology activities; thirdly, science and technology activity is a system changing constantly; and on the basis of this, they put forward the problems in science and technology management innovation in this new period<sup>[2]</sup>.

A large amount of practices at home and abroad proves that, the only way to get coordinated growth between technology and economy and society is reform. Many scholars researched science and technology system reform, Liao Tiantu, Dai Tianfang(2009) summarized the 4 stages of China science and technology system reform after the state's founding, and got some enlightenments for science and technology system reform<sup>[3]</sup>. He Dang (2011) analyzed the problems science and technology development and science and technology system reform met, and put forward some suggestions<sup>[4]</sup>.

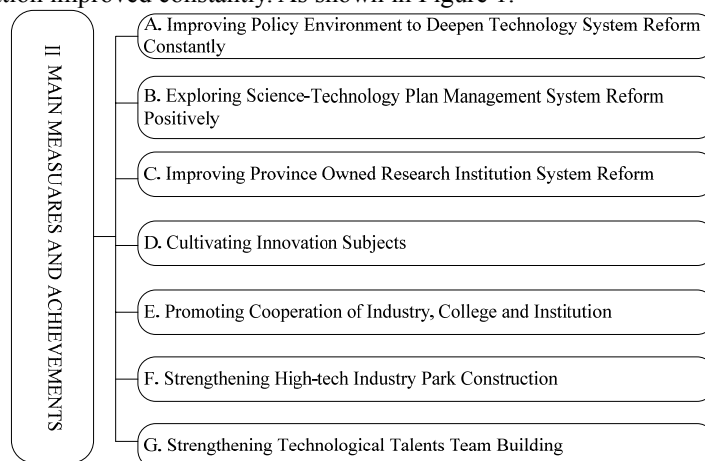
The ultimate aim of reform is to help science and technology achievements being used in producing widely, science and technology worker expressing their talents, liberating science and technology productivity, improving economy and society development. And if we want to innovate, we should form new management concept in science and technology activity's aim, organization, leading and controlling.

Technology system reform is the important motive power of technology management innovation and technology development. In the first decade of the 21st century, China Hubei provincial Party committee and government adopted a series of measurements to accelerate the development of technology management innovation and technology system reform, to advance the release of technology the first productive force, and got great achievements and precious experiences. This paper researching Hubei province's experiences in science and technology management innovation and science and technology system reform, to put forward main problems and respectively solution in science and technology management innovation and science and technology system reform.

## 2 Main Measures and Achievements

Since 21<sup>st</sup> century, China Hubei province adopted science and education boomed Hubei and talents

strengthen Hubei province strategies, via improving technology management system reform, province owned research institution system reform, finance technology investment mechanism innovation, industries, universities and research institutes cooperation mechanism innovation and so on, and got outstanding achievements in local innovation system building, technology investment and financing system establishing, technology talents team building, technology intermediary services system constructing, high technology industry park building and so on<sup>[5]</sup>. The province's different innovation subjects' innovation vitality grew policy environment, system environment and social environment of technology innovation improved constantly. As shown in Figure 1.



**Figure 1 Main Measures and Achievements of Hubei Province of China Last Ten Years**

### **2.1 Improving policy environment to deepen technology system reform constantly**

The National People's Congress, Party committee and government of Hubei province issued local regulations, such as Hubei province scientific and technological progress regulations, Hubei province science and technology popularize regulations, Hubei province individual owned science and technology enterprises regulations, Hubei province patents protection regulations, Hubei province technology market management regulations, and other important files like Decision on strengthening independent innovation ability and building innovative Hubei, Suggestions on deepening reform innovation mechanism and accelerating high-tech industry's development (trial implementation), Suggestions on building long-term independent innovation mechanism, Hubei province further research institution system reform implementation advices, and different regions and departments issued a series of matching policies about the improvement of technology innovation<sup>[6]</sup>. These regulations and policies made important innovation and break in increasing financial technology investment, innovating financial technology investment channels, improving technology resources configuration, encouraging technological workers to venture, developing options motivation, deepening college technological enterprise system reform, supporting R&D research institution system reform, and motivating post technology achievements transformation. Regulations and policies system promoting technology development has formed in the whole province, technology progress and independent innovation has built a good policy and legal environment.

### **2.2 Exploring science-technology plan management system reform positively**

Hubei province improved science-technology plan management system reform to establish technology innovation system enterprise subjective, market oriented, and industry, college and institution cooperative; from focusing on college and institution's R&D to building technology innovation system enterprise subjective, market oriented, and industry, college and institution cooperative, and leading technology resources gathered to the first line of economic construction effectively. The whole province's financial technology input mechanism reform and innovation work improved constantly. In 2009, it issued "Suggestions about innovation technology input mechanism", which had 19 specific policy measures to expressing the leading, modeling and amplification effect of financial technology input, to accelerating the establishment of multiple channel, multilevel technology input system. At the present, Hubei has built 3.5 billions venture input leading fund, and supported ten venture investment fund, its total scale is beyond 20 billions. What's more, it promoted commercial bank and venture investment organizations to build "investment and loan cooperate mechanism", forming a Hubei style "accompany investment", "accompany loan" and "accompany allowance" service

mechanism. In 2010, Hubei province organized technological medium-sized and small enterprises to declare national issued medium-sized and small enterprises ensemble bond, whose total value was 5.19 billions<sup>[7]</sup>.

### **2.3 Improving province owned research institution system reform**

Hubei province strengthened top plan of 2.2 exploring science-technology plan management system reform and innovating, stuck to the reform direction of R&D research institution enterprises transforming system. Depending on implementing guidance and accompany service, it accomplished Hubei chemistry research institution, Hubei building materials industry research and design institution's reform. Among all R&D research institutions, there has been 11 institutions transformed to enterprise and registered in business and administration department, 4 of them went into colleges now, which indicates that the constitutive adjust mission of Hubei R&D research institution has already been done basically.

### **2.4 Cultivating innovation subjects**

The province chose 150 medium-sized and small enterprises who had innovative ability and innovative demand, applying methods like technology plan, financing service, talents supporting to support their innovation ability building, to promote and implement the nation's finance and tax poly for encouraging enterprise innovation, and solve financing problem through different channels. In 2010, 111 of these companies took advantage of R&D expenditure discount, which valued 2.23 billions. At the present, Hubei province has 7 enterprises in the list of national innovation enterprises, 16 enterprises in the list of national experimental enterprises. In the same time, Hubei province promoted "management coaching, policy training, expert helping, platform supporting" service to strengthen reserved coming into market high-tech company to foster their independent innovation ability, pointing to the development demand of technological medium-sized and small enterprises, and choosing "early stage company developing to growth stage company, growth stage company developing to expansion stage and reserved coming into market company" as direction.

### **2.5 Promoting cooperation of industry, college and institution**

Hubei province adopted enterprise subjective, market oriented, and government leading style, gave full play to basic effect of market optimized configuration of innovation resources, strengthened industry capital, knowledge capital and financial capital organic combination, improving deep fusion between enterprise, industry, base and college, science and technology R&D institution, and the joint of application research and industry demand. It built industry technology innovation strategy alliance, industry technology innovation base, company technology innovation platform, and public technology service platform and so on. Now, it has established 20 industry technology innovation strategy alliances above province level such as phosphor resources development and exploit, rape process, and 3 of them has been ratified to national industry technology innovation strategy alliance by technology department.

### **2.6 Strengthening high-tech industry park construction**

Since 1988 Donghu high-tech park established, the province ratified Xiang Yang, Huang Shi, Jin Zhou, Ge Dian, Xiao Gan, Shi Yan, Yi Chang etc. 14 provincial high-tech industry park (including 3 national high-tech park). After several years' efforts, high-tech park has been the cradle of technology venture, carrier of high-tech company, base of technology innovation, platform of attracting investment, lightspot of local economy. In 2010, 14 high-tech parks' high-tech industries' gross output reached 2293.43 billions, corresponding period growth is 26.6%; realizing high-tech industry growth output 720.46 billions, corresponding period growth is 25.6%; high-tech products sale is 2208.95 billions, corresponding period growth is 28.8%; realizing interest and tax 225.54 billions, corresponding period growth is 44.6%.

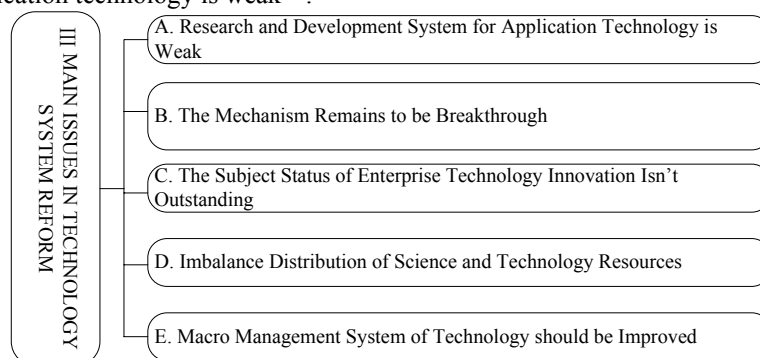
### **2.7 Strengthening technological talents team building**

The province took implementing technology plan as link, through establishing innovation bases like national and provincial key lab, engineering technology center fostered a large number of national high level talents. At the present, the province has 56 academician of the Chinese Academy of Science and the Chinese Academy of Engineering, 46 national chief experts (ten more in 2010), 48 education ministry Yangtze River scholar (range 4 in the whole country), 20 young and middle-aged experts selected into national "hundred, thousand and myriad engineering", 83 young and middle-aged experts made extrude contribution to the nation, and 2564 experts took the State Council government special allowance.

### 3 Main Issues in Technology System Reform

#### 3.1 Research and development system for application technology is weak

Pure researches such as scientific papers, prize-winning achievements, taking the national research plan produce high; while the output of commercial application results such as patent and new products is low. To develop technology for application oriented by university is insufficient originally; the application research function of institutions of development is weakened after the reform; public kind of application technology research institutions of development lags behind; and research and development system for application technology is weak<sup>[8]</sup>.



**Figure 2 The Main Issues in Promoting Science and Technology Management Innovation and Technology System Reform in Current**

#### 3.2 The mechanism remains to be breakthrough

Universities and research institutes usually tend to focus on advanced technology and ignore market demand, so results themselves have a large gap from commercial application, and the demand innovation achievement of enterprise is the bald mature technology. The mechanism of long-term combination of enterprises, universities and research institutes and the mechanism of effectively operating the new combination of innovation organizations such as construction of industry technology innovation strategy alliance and biotechnology research institute are still needed to be explored.

#### 3.3 The subject status of enterprise technology innovation isn't outstanding

The proportion of enterprise engaged in activities of science and technology is low. There are only 13% industrial enterprises have activities of science and technology in Hubei Province, it's not only greatly lower than some developed provinces and cities such as Beijing (25.8%) and Zhejiang Province (22.3%), but also lower than Anhui Province (15.3%) and Hunan Province (14.9%) which are in central regions too. In the provincial scientific research and test development expenditure, 63.6% is put into enterprise, low 8.1% less than the national average level.

#### 3.4 Imbalance distribution of science and technology resources

Big cities have intensive science and technology resources, while small and medium-sized cities especially counties have insufficient technology resources. Wuhan and Xiangyang concentrate nearly 60% of the scientific and technical personnel, and 70% of the funds of science and technology in Hubei Province. The technology force of small and medium-sized city and county is weak, especially in rural, technology resources are relatively scarce.

#### 3.5 Macro management system of technology should be improved

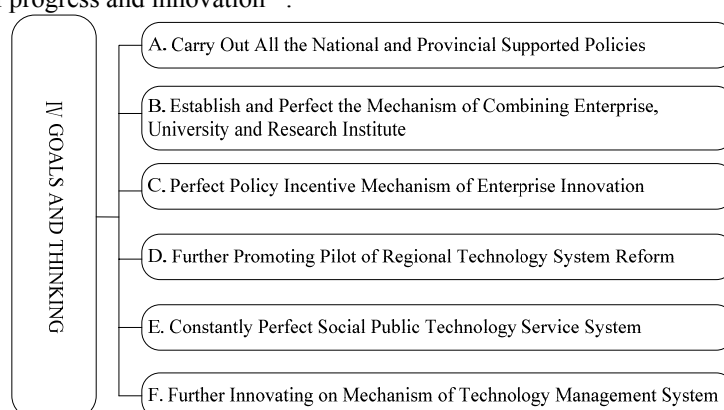
There are phenomena of segmentation and disjointing with each other among the departments in charge of science and technology, economy, education, personnel, finance and tax. The lack of effectively unified as a whole and strategy synergy; supporting is not enough in science and technology policies and industry, education policy; thus lead to some good science and technology policies are often difficult to put in place.

### 4 Goals and Thinking

#### 4.1 Carry out all the national and provincial supported policies

Strengthen detailed rules for the implementation of the policies such as department coordinating, fluctuation linkage, formulating fiscal expenditure on science and technology, technical resources sharing, claiming enterprise development cost 150% additional deduction, the government procurement of independent innovation products, "the four 70%" of scientific and technological personnel transforming position scientific achievements. Promoting to carry out all the national and provincial

supported policies and measures of the independent innovation, develop its roles of innovative guide, motivation and security in construction of Hubei province, and create better environment of scientific and technological progress and innovation<sup>[9]</sup>.



**Figure 3 Goals and Thinking of the Promotion of Scientific and Technical Management Innovation and Technology System Reform in the Next Five Years**

#### **4.2 Establish and perfect the mechanism of combining enterprise, university and research institute**

Establish the effective mechanism of cooperation of openness and resources sharing in enterprises, universities and research institutes, and to promote the interests sharing, risks sharing, cooperating to win of the parties in cooperation. Build the classification evaluation system for the scientific and technological personnel in universities and research institutions. Arouse the enthusiasm of the innovation of scientific and technical personnel, and guide the scientific and technical personnel gathering to the front of economic and social development. Develop technology transfer institutions, hold the talks of cooperation in enterprises, universities and research institutes, and create a platform for universities, research institutes and enterprises in things of technology development, technical service, achievements transfer and talent docking.

#### **4.3 Perfect policy incentive mechanism of enterprise innovation**

Implementing special actions of innovative enterprise construction and growth roadmap of technological small and mid-sized enterprise, to cultivate a group of enterprises which have great innovation ability to be the subject of technological innovation and stimulate enterprises' innovation initiative. Use technical innovation ability as an important index in assessment of state-owned enterprises, and make the technical factors participating in distribution as the important content in the property rights system reform of new and high technology enterprises.

#### **4.4 Further promoting pilot of regional technology system reform**

Use the east lake independent innovation demonstration zone as a breakthrough, have comprehensive innovation in mechanism of hi-tech innovation technology innovation system, and promote the high-tech area to move forward to the world first-class zone. Play the radiation effect of east lake high-tech zone, to drive the ability of independent innovation the ascent of the whole of all high-tech zones in Hubei province.

#### **4.5 Constantly perfect social public technology service system**

To the technology enterprise incubators, productivity promoting centers as the key, to cultivate all kinds of science and technology intermediary services agents, lead them to develop service function, improve service quality, and gradually develop to specialization, scale and standardization. Promoting the construction of public technology service platform, the industrial generic key technology and demand of small and medium-sized technological enterprise are as the guidance, and guide to establish public technology research and development platform, technology detection platform, etc.<sup>[10]</sup>

#### **4.6 Further innovating on mechanism of technology management system**

Promoting the organic integration of science and technology system reform and economic system reform, and continuously optimize the market mechanism and environment of encouraging technology innovation and venture. Promoting the reform of plan management, funds management, evaluation incentive system of science and technology's, and further optimize the way to guide and support technological innovation by government. Further expand the opening up, open configuration of science and technology resources, promote the fusion of each kind of innovative factors, to attract domestic and international enterprises, research and development institutions to set up R&D center and branch office,

etc. in our province, and realize borrows the development.

## 5 Conclusions

Technology system reform is the important motive power of technology management innovation and technology development. The main measures and achievements in technology system reform of Hubei Province include improving policy environment to deepen technology system reform constantly, promoting cooperation of industry, college and institution, establishing its stable form and long-term mechanism and so on. Although there are many issues in promoting science and technology management innovation and technology system reform in current, it will become better from carrying out countermeasures and suggestions above. In the end, the technology system reform of Hubei Province will be pushed ahead greatly.

## References

- [1] Ma Sanbao. College Science Research Management Should Strengthen Three Realizations[J]. Management of Research and Development, 2000,12(4): 53-54
- [2] Lv Xiumei, Xue Zhansheng, Yu Jihai. Several Problems in New Period Science and Technology Management Innovation[J]. Science and Research Management, 2004,25(5):26-27
- [3] Liao Tiantu, Dai Tianfang. The Historical Development and Enlightenment of China Science and Technology System Reform after the State's Founding[J]. Jiangxi Agriculture Journal, 2009,21(9):190-192
- [4] He Dang. China Science and Technology System Reform and Its Development[J]. Guild to Business, 2011,(7):1-2
- [5] China Hubei Province Science-technology Progress Regulations[EB/OL]. <http://baike.baidu.com/view/4193788.htm>. (In Chinese)
- [6] The Icebreaking Trip: China Hubei 30 Years Technology System Reform. (In Chinese)
- [7] China Hubei Technology Statistic Year Book 2010[EB/OL]. <http://www.hbnj.com.cn/cn/index.asp>. (In Chinese)
- [8] Enterprise Innovation Management[M]. The National Defense Technology University Press, 2008: 84-90. (In Chinese)
- [9] Establishing Innovative Nation[M]. Learning Press, July 2007: 59-67. (In Chinese)
- [10] China Hubei Technology Development Plan Outline for "The Twelfth Five Years" [EB/OL]. <http://www.hbzyw.gov.cn/xwxx.asp?id=11646>. (In Chinese)