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POLICY SUGGESTIONS ON THE DEVELOPMENT OF SCI-TECH FINANCE IN ZHEJIANG, CHINA

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Abstract

Transformation is a pressure faced by Chinese enterprises. As the first productivity, Sci-tech is the key to enterprise transformation and upgrading, and even to national strategic structural adjustment. Most enterprises conducting technological R&D and innovation are all faced with fund shortage. It is crucial and urgent to study how finance promotes Sci-tech progress and development. Based on a large quantity of survey data, by studying the current situation and difficulties of Sci-tech finance development in Zhejiang province in China, this article focuses the two major cities in the province: Hangzhou and Ningbo as typical cases to discuss how to perfect Sci-tech finance policies in Zhejiang province in order to lay the foundation for further promoting Scientific and technological development in Zhejiang province.

Keywords:

Sci-Tech Finance, Current Situation, Difficulties, Zhejiang Province

1. INTRODUCTION

1.1 RECENT SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT IN ZHEJIANG

Zhejiang's expenditures for the whole social scientific and technological activities were RMB 120 billion in Zhejiang province in 2012, up 19.6% from 2011. The R&D expenditures were RMB 70.6 billion, up 15% from a year ago. Fiscal appropriations for science and technology reached RMB 16.6 billion, up 15.3% from a year ago. Fig.1, lists the change of funding in Scientific and technological research funding from 2008 to 2012 in Zhejiang. Since 2008, obvious growth trends have been shown in the expenditures for scientific and technological activities, R&D expenditures and fiscal appropriations for science and technology. In particular, the expenditures for whole social scientific and technological activities in 2012 doubled compared with that in 2008.

Compared with nearby Shanghai and Jiangsu, Zhejiang is slightly lagged in scientific and technological industry development and is relatively lagged in new and high-tech industry development. For example, in terms of the quantity of new and high-tech enterprises, there were 4,539 in Zhejiang at the end of 2012; while there were 1,825 new and high-tech enterprises newly identified by Jiangsu province at the end of 2012, the accumulative total number reached 5,677. There were 1,442 new and high-tech enterprises newly identified and reviewed by Shanghai within the year, with a total number of 5,031. However, the rapid development of new and high-tech industry in Shanghai and Jiangsu can't do without the vigorous support of Sci-tech finance. Table.1 shows the regional distribution of new and high-tech enterprises throughout the province. From the perspective of and the development of new and high-tech enterprises, Hangzhou has the largest number of high-tech enterprises in the whole province.

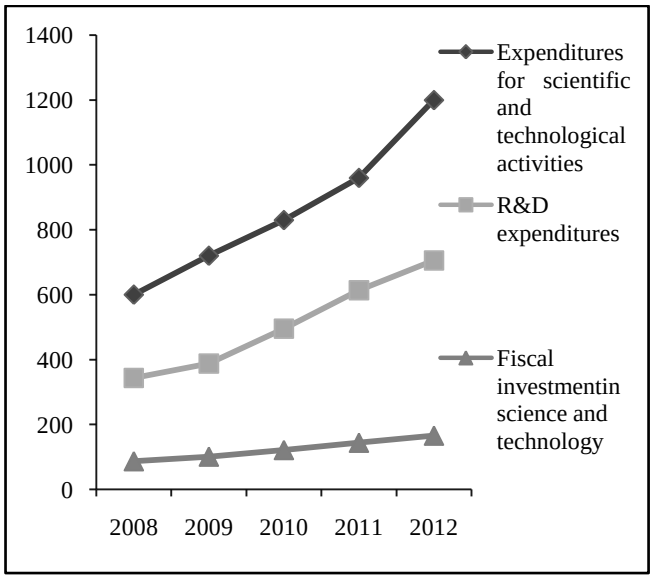

Fig.1. Scientific and Technological Research Funding in Zhejiang in 2008 - 2012 (RMB 0.1 billion)

Table.1. Regional Distribution of New and High-tech Enterprises in Zhejiang (Year 2010 - Year 2012)

Ranking	City	2010	2011	Reviewed in 2011	2012	Reviewed in 2012	Subtotal
1	Hangzhou	247	190	664	189	232	1522
2	Ningbo	51	161	407	189	124	932
3	Wenzhou	97	97	76	102	101	473
4	Shaoxing	47	56	112	62	58	335
5	Taizhou	103	27	50	35	119	334
6	Jiaxing	44	46	85	43	75	293
7	Huzhou	36	47	54	43	54	234
8	Jinhua	30	37	50	41	52	210
9	Lishui	18	23	10	32	13	96
10	Quzhou	14	11	20	12	17	74
11	Zhoushan	8	3	5	6	14	36
Total		695	698	1533	754	859	4539

2. IMPORTANCE OF SCI-TEC FINANCE TO DEVELOPMENT OF NEW AND HIGH-TECH INDUSTRY IN ZHEJIANG

2.1 PROMOTION OF FINANCE SUPPORT TO SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

Sci-tech finance refers to the systematic and innovative arrangements for a series of financial tools, financial systems, financial policies and financial services promoting scientific and technological development, achievement transformation and new and hi-tech industry development. It's the system jointly which consists of all kinds of subjects providing resources to scientific and technological innovation activities such as government, enterprises, market and social intermediary agencies as well as their behaviors and activities in the process of financing for technological innovation, and is an important constituent part of national technological innovation system and financial system.

Science and technology need financial support and need funds as guarantee. Sci-tech development, achievement transformation and industrialization process need strong support from financial instruments, financial policies and financial services. Technological innovation is a costly and risky activity, especially needing external financial support. A good financial system can satisfy special financing demands in various growing periods for science and technology industry.

Due to the unique features of science and technology projects, which are highly risky, lack of collaterals, and long period of payback, traditional finance models such as bank loans and private equity funds are not available to high tech firms. Therefore governments usually provide special funding assistance to these high tech start-up firms such as government led venture fund with mixtures of both public and private financing sources, while government takes majority share of risks. This paper will discuss several ways to design financing models for Sci-tech companies and make some policy suggestions to governments to promote Sci-tech finance development in Zhejiang, China.

2.2 THE DEVELOPMENT OF SCI-TECH FINANCE IS THE KEY TO SOLVING THE PROBLEM OF FINANCING DIFFICULTY FOR SCIENTIFIC AND TECHNOLOGICAL ENTERPRISES IN ZHEJIANG

The scientific and technological enterprises in Zhejiang, especially scientific and technological small and media enterprises (SMEs), like other peers throughout the country, also have suffered from the development bottleneck including narrow financing channels and unsmooth fund turnover. New and high-tech industry needs larger-scale financial capital support than traditional industries. The fund matching at the three phases of new and high technology including technology development, product development and production capacity development is 1:10:100. So the relationship between new and high-tech industry and finance is inseparable. If there are no sustainable financing channels, the R&D of new and high technology will be impeded and enterprise innovation will be curbed. Therefore, the development of Sci-tech finance is the urgent need to accelerate the development of new and high-tech industry in Zhejiang province.

2.3 THE DEVELOPMENT OF SCI-TECH FINANCE IS THE KEY TO IMPROVE THE APPLICATION OF SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

According to the statistics from State Intellectual Property Office, China's patent implementation ratio is only about 10%, and only 10-15% for the circumstance that scientific and technological achievements are turned into production which is far below the level of 60-80% in the developed countries. The output value of high and new technology in our country only accounts for about 8% of the total industrial output value, below the level of 30-40% in developed countries. Low conversion rate in scientific and technological achievements in China is largely due to the lack of sufficient financial support and effective financing channels in the process of marketing of Scientific and technological achievements.

3. SCI-TECH FINANCE MODE AND ENPERIENCE OF HANGZHOU

Hangzhou is the capital of Zhejiang province. In recent years, Hangzhou is devoting itself to create "Paradise Silicon Valley" to enhance the soft power, the development momentum is good for the new and high-tech industries led by information and new medicine, environmental protection and new materials, and they have become one of the features and advantages of Hangzhou.

3.1 SPECIFIC MEASURES TO DEVELOP SCI-TECH FINANCE IN HANGZHOU

Hangzhou has established a venture investment service center to set up venture investment seed funds, policy-type Guarantee Company and Sci-tech sub branch, and to built up a platform which has four functions including project support, financing consultation, intermediary services and business coaching. Through the investigation on Sci-tech finance in Hangzhou, we summarize the main policies and experience of Hangzhou on Sci-tech finance:

- The management of government's venture investment seed fund is quite successful. Firstly, the share of government participation is no more than 25%, and only principal needs to be returned if it lasts for less than three years. After three years, principal plus the interest of the bank for the same period will be returned to private capital. Secondly, there is indicator stipulation for the investment projects, no less than 30% of the funds must be invested in start-up enterprises and 60-70% of the funds must be invested in Hangzhou area. Thirdly, once a constraint mechanism is established, an agreement shall be signed with bank who will supervise capital operation.
- Promoting Hangzhou Bank to establish Sci-tech sub branch. This sub branch is required to change the traditional financial evaluation criteria. Lend decisions

should be made based on the characteristics of scientific and technological SMEs, such as small assets and high growth potential. Pay more attention to other non-financial indicators such as product technology, team member and business model, etc.

- The government has set up a wholly-owned high-tech enterprise guarantee company with registered capital of RMB 200 million to provide guarantee for start-up enterprises and sign with the cooperative bank for risk taking rule of 2/8. Option guarantee mode is created. If the guaranteed enterprise develops well, the guarantee company can cash share options in the future.
- Facilitating the launching of "circulating funds". "Revolving funds", also known as bridge funds, are specifically designed to solve the problem of repaying loan to bank. The interest rate of circulating revolving funds is 2/10000, which is significantly lower than bank loan interest rate and the rate of other financial organizations. At the same time, it is regulated 2/10000 interest rate within 15 days and 6/10000 beyond 15 days, which not only meet the needs of most enterprises, but also improve the capital usage efficiency and avoid the funds to be held by some enterprises for a long time.

Table.2. Typical Cases of Hangzhou Bank Sci-tech Sub branch

Enterprise name	Industry	Enterprise difficulties	Evaluation standard	Loan mode	Situation
Zhejiang UHOPE Communication Technology Co., Ltd.	IT	Long-term enterprise business advances, have financing gap for new orders, but light assets go against bank mortgage loan	Enterprise has technical reserves and good team, most downstream firms belong to monopolizing industries, with guaranteed payment collection, overall debt ratio is low, and listing guidance has proceeded	To grant comprehensive credit of RMB 30 million based on the order	Enterprise sales have exceeded RMB 100 million, it's planned to declare IPO in 2014
Hangzhou ZETA Technology Co.,Ltd	TRT control system	Have multiple patents, large fund demands for rapid development, but light assets go against bank mortgage loan	Enterprise products have high technological level and industrial technological threshold is high, enterprise business is growing continuously, management team is steady and internal management is normative	Intellectual property right mortgage loan of RMB 15 million	Sales break through RMB 0.3 billion; enterprise product TRT control system is adopted in 80% of TRT projects of chemical enterprises
Hangzhou EWELL Technology Co., Ltd.	Medical information	Funds are occupied a lot in the business expansion of enterprise, and it's hard for light assets guarantee	The enterprise is a leader in the field of domestic medical Internet of Things, the core team has entrepreneurial experience, and accounts receivable are of good quality	Credit loan accompanied with mortgage of accounts receivable of RMB 20 million	The investment from domestic multiple venture investment organizations have exceeded RMB 100 million, IPO will be declared in 2014.
Zhejiang Betta Pharmaceuticals Co., Ltd.	Medicine	Insufficient fund to develop new medicine	The team is from the international first-class Scientific research institutions, and is included in the national Recruitment Program of Global Experts; the new medicine has entered the third phase of clinical trials and has market potential	Credit of RMB 20 million	It has completed phase III clinical trials smoothly, annual sales are RMB 300 million
Zhejiang Shenda Intelligent Technology Co., Ltd.	Park digitization and intelligence scenic spot application system	Large funds are needed for platform input, but mortgage loan is difficult	Enterprise development prospect is good, asset structure is clear and market share is stable	Grant equity pledge loan of RMB 5 million	Annual sales were RMB 30 million in 2011 & trial operation of platform was completed smoothly
Zhejiang Haituo Environment Co., Ltd.	Environmental protection	Enterprise receives sewage treatment orders and has large working capital	Marketing is stable; the industry is supported by the state, 60% of shares in the province are occupied by	Grant credit of RMB 15 million to the enterprise, and grant the same amount to	Sales break through RMB 100 million, with an annual growth rate of more

		demand	the enterprise	its upstream and downstream enterprises	than 30%
Hangzhou Zhongwei Photoelectricity CO.,LTD	LED detection production equipment	There are many orders, but enterprise capital is insufficient to support its sustainable development	Leading level and industrial stability rank the top three; equity investment has been obtained and orders are stable	Follow up loan credit of RMB 40 million to enterprise and project loan is RMB 50 million	Annual sales have exceeded RMB 100 million, IPO is being declared
Hangzhou Golden Coast Culture Development Co., Ltd.	Cultural innovation	Large equipment investment, but the evaluated value is not large upon financing	The cultural industry is the one supported by enterprise; enterprise operation is stable; it has stable cash flow and strong replicability for enterprise mode, easy to form scale effect	Evaluate the trademark of "Golden Coast" grand stage, trademark is pledged for RMB 20 million	It has been listed and has been elected as the strongest domestic cultural listed enterprise for three consecutive years.
Zhejiang Kaichuang Environmental Protection Technology Co., Ltd.	Environmental protection	Less fixed assets and larger R&D funds; the period of accounts receivable is long after the orders are produced	Sewage treatment is an industry supported by the whole world; it has good market share and its technology is leading at home; it has many patents	Introduce the third party guarantee agency, equity pledge loan is RMB 5 billion; then the enterprise obtains venture investment fund and the subbranch conducts joint loan of bank and venture investment company with the amount of RMB 7.5 million	It has pulled through initial stage of R&D; sales reach RMB 50 million this year, and profit of RMB 5 million is created
Hanzhou Energy Investment Management Co., Ltd.	Contract energy management	It just received a project with the input of RMB 19 million and payment collection will be completed within 3 years; enterprise accumulation is limited and there is financial strain	EMC project belongs to the project with one-time investment and staged collection; enterprise product technology has been mature, with high energy-saving efficiency; it also has experience and repayment sources are stable	Provide contract energy management financing of RMB 8 million, pledged with project's future earnings	It has become the leading enterprise in EMC industry

From the typical cases in Table.2, it can be seen Sci-tech sub branch would not grant loans merely based on the financial data and fixed assets of the technology-based enterprise, which facilitates those enterprises access to more capital. We can see from these typical cases that the primary evaluation criteria for Sci-tech sub branch to grant loans are government support, stable orders, and original patented technology, stable or huge amount of customers, commercial projects, and receiving venture capital and so on. Accordingly, based on these evaluation indexes, the bank introduced appropriate financing products, such as credit loans etc., pledge of accounts receivable, equity pledge, intellectual property right pledge loan, trademark pledge, contract energy management loan contract, bank and investment institutions loan.

Apart from the outstanding achievements of the Sci-tech sub branch, secured financing in Hangzhou possesses numerous types and performs well. Since the establishment of Hangzhou High-tech Security Company in 2006, the amount of the financing loans provided for 750 medium-sized and small technology-based enterprises has totaled RMB2.6 billion. Average loans per enterprise was RMB340 millions. Among them, more than 90% enterprises met the standards of top ten enterprises in Hangzhou. Secured funds have been enlarged for 13 times. Table.3 is the condition of Hangzhou Financing Guarantee in 2012.

Table.3. Hangzhou Financing Guarantee in 2012

	Amount Guaranteed (million RMB)	Number of Enterprises	Single Amount Per Deal (million RMB)	Amount Guaranteed in 2011 (million RMB)	Increasing Ratio of Amount Guaranteed in 2012 compared with 2011 (%)
Total amount of Secured Financing	102285	255	401	66300	54%
Angel Guarantee	30108	100	301	21225	42%
Enterprises in "Eagle Projects"	18178	51	356	15600	17%
Enterprises launched by college students	4570	21	218	2340	95%
Pledge for Knowledge Property Right	6038	14	431	7550	-20%
Integrated Risk Pool of Angel Capital Investment	32000	89	360	23510	36%
Follow up Guarantee Loan	14500	23	630	7810	86%
Angel Guarantee	30108	100	301	21225	42%

With multi-level financial policies, the government of Hangzhou founded the Guarantee Company for High-tech Enterprises in 2006, formed Governmental Venture Guiding Fund in 2008, set up Sci-tech Sub branch of Hangzhou Bank in 2009, introduced Integrated Risk Pool of Angel Capital Investment in 2012, and officially launched the project of "Revolving Funds". From the time of implementing policies, it is believed that the government of Hangzhou has recognized that technology-based enterprises faced difficulties in financing in the early time, but not until the year of 2008 that relevant policies started to be put forward and become more attractive to them.

Table.4. Output Value (hundred million) of High-tech Enterprises and Its Share in Gross Industrial Output Value of Hangzhou from 2005 to 2011(%)

	2005	2006	2007	2008	2009	2010	2011
Output Value of High-tech Enterprises (hundred million RMB)	800.47	1188.02	1079.91	988.3	875.97	1109.26	1213.84
Share in Gross Industrial Output Value (%)	14.7	17	12.9	10.59	9.3	10.02	9.92

The Table.4 shows the variation of output value of high-tech enterprises and its share in Gross Industrial Output Value of Hangzhou from 2005 to 2011. From the table, it can been seen that the variation of output value of high-tech enterprises and its share in Gross Industrial Output Value of Hangzhou made a great breakthrough in 2006. Moreover, there was a great leap after the founding of the Guarantee Company for High-tech Enterprises, with the absolute value exceeding RMB100 billion and the relative value breaking 15%.

Table.5. Hangzhou Research and Experimental Development Fund from 2005 to 2011

Year	Internal Expenditures of Research and Experimental Development Fund (hundred million RMB)	Proportion of Research and Experimental Development Fund in GDP of Hangzhou (%)
2005	73.1	2.48
2006	91.2	2.65
2007	113.18	2.75
2008	122.2	2.56
2009	137.59	2.74
2010	166.87	2.8
2011	202.35	2.89

The Table.5 is research and experimental development fund of Hangzhou from the year of 2005 to 2011. From the table, it can be seen that the internal expenditure of research and experimental development fund grew rapidly after the year of 2005, and the proportion of research and experimental development fund in GDP of Hangzhou increased year by year as well. The average growth rate from the year of 2005 to 2011 is more than 17%. Comparing to the absolute value of the research and experimental development fund, the relative value to GDP basically maintained a sustainable rising trend.

Table.6. The Amount of Patent Applications and Authorizations in Hangzhou from 2005 to 2012

Indicators	2005	2006	2007	2008	2009	2010	2011	2012
The Amount of Patent Applications	9486	1071*9	13295	18549	26077	29732	40890	53785
The Amount of Patent Authorizations	4072	5721	7563	9831	15507	26483	29249	40651

The Table.6 is the amount of patent applications and authorizations in Hangzhou from the year of 2005 to 2012, and Fig.2 is the growth rate of the amount of patent applications and authorizations in Hangzhou from 2006 to 2012. After taking the first measure - of Sci-tech finance, the amount of patent applications has increased significantly with an annual growth rate of 20% to 30%. Till the year of 2009, the implementation of numerous Sci-tech finance policies made the growth rate reaching its peak of 40.6%, which reflects that policy measures in 2008 and 2009 effectively drove the increase of the amount of patent applications. Even though the growth rate dropped slightly in 2010, it returned to a higher level again in 2011. Moreover, we can see that the amount of patent authorizations increased rapidly after the implementation of Sci-tech finance policies. In the year of 2010, it grew 70.8% over the previous year. In the year of 2011, the amount of patent authorizations declined mainly because that the State Intellectual Property Office expedited reviews of piled patent applications, promoting the accelerated growth of patent authorizations in 2010 and affecting the growth of it in the following year. The increasing amount of patent applications and patent authorizations shows the dynamism of the research and development activities to some extent. Starting from 2005, activities of the research and development in Hangzhou have been kept at a high level.

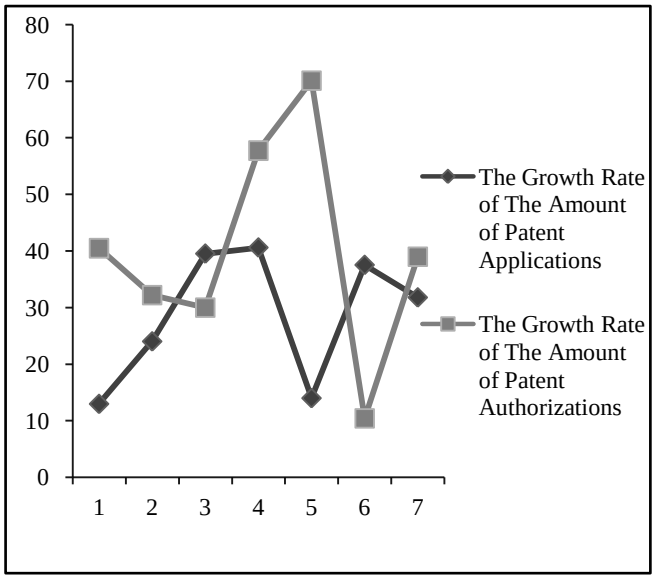

Fig.2. The Growth Rate of the Amount of Patent Applications and Authorizations in Hangzhou from 2006 to 2012

Table.7. Development of innovation platforms in Hangzhou from 2005 to 2011

Primary Index	Secondary Index	2005	2006	2007	2008	2009	2010	2011
Innovation Platforms	National or Provincial Enterprise R&D Centers and Technology Centers(number)	114	160	207	248	328	382	450
	High-tech Enterprises above the Provincial Level (number)	417	519	646	804	1106	1361	1550
	National or Provincial Key Laboratories and Engineering Research Centers (number)	87	91	100	125	145	162	184

The Table.7 displays the development of innovation platforms in Hangzhou from the year of 2005 to 2011. From the table, we can see that the number of national or provincial enterprise R&D centers and technology centers, key laboratories and engineering research centers maintains a rapid rising trend from the year of 2005 to 2011. This table also reflects the number of high-tech enterprises above the provincial level. The number of R&D centers and technology centers and laboratories embodies the capacity of innovation and the potential for industrial development while the number of high-tech enterprises above the provincial level manifests the capability of industrialization and technological innovation. Starting from the year of 2005, absolute number of high-tech enterprises above the provincial level grows at an annual rate of 24.65% and maintains a sound trend.

It can be seen from the above information that measures Sci-tech finance launched in 2006 and largely introduced in 2008 have made a great impact and they should be enforced to promote the development of the small and medium-sized enterprises, to facilitate the overall development of the economy, and to raise revenue.

4. EXPERIENCE OF THE DEVELOPMENT OF SCI-TECH FIANCE IN NINGBO

There were more than 70 policies related to science and technology, covering all aspects of Scientific and technological input, financial support, intellectual property protection, science and technology innovation bases and construction of platform, and construction of a contingent of technology talents.

There are more than 70 venture capital companies in Ningbo, and thirteen of them are founded by the cooperation of domestic well-known institutions. Main cooperative participants in these companies are Ningbo government guide funds, private entrepreneurs, government-affiliated industrial companies, large private group corporation, domestic talented professionals; those above mainly invest in the fields of high and new technology. In the year of 2012, the government established the venture capital guiding funds that worthy of RMB 1 billion and the initial funding of it was RMB 250 million. At the end of 2012, three equity funds were set up and the total amount of capital subscription was 578.5 million, including RMB 110 million Ningbo government guide funds with funds magnification factor about 5.26 times. In November 2011, Technology Branch of the

Bank of China in Ningbo was launched in state-level new and high-tech zone. After that, Sci-tech sub branch of the Hangzhou Bank was settled down in Yinzhou district of Ningbo in January 2012 which marked the official establishment of professional branch for science and technology and financial cooperation, and a step further to solve the problem of financing difficulties for small and medium-sized enterprises. Ningbo actively explores cooperation model, named "risk pool", in which the financial risks shared by the government, the banks, and the enterprises, to solve the puzzle that small and medium-sized enterprises have difficulties in fund-raising. In July 2011, they built a risk preparation funds pool with rolling development in Ningbo which consists of 5% of the loans from finance expenditure in new and high-tech zone of Ningbo, 2% from security companies, and 1% from loan companies. The sum of venture capital pool equals to 8% of the loans. Management Committee in new and high-tech zone of Ningbo offered RMB 5 million to undertake the function of re-guarantees. By magnifying for twenty times, these funds could provide RMB 100 million credit support for technology-based small and medium-sized enterprises.

Guiding funds for policy-oriented Angel Investment that is not profit-oriented would be established in Ningbo. Within five years, the amount would reach RMB 500 million. The funds can encourage and guide the social capital to carry out an angel investment to promote the rapid development of innovative start-ups. Generally, the single enterprise could apply for less than RMB 2 million investments from the funds. The accumulative amount of the investment would not exceed RMB 5 million and the accumulative amount of the investment for the single enterprise should be limited within 50% of angel investments. The funds account for less than 20% of the equity of enterprises.

Meanwhile, the government enforces and improves the construction of financing guarantee system, creates new modes and financial products for financing guarantee, and broadens the scope of collateral for financing to provide financial support for technology-based small and medium-sized enterprises. For example, based on the platform of trust company, the government integrates the resources of finance, trust, social capital, and venture capital to originate a comprehensive trust plan for small and medium-sized enterprises and build new financing channels for them.

5. PROBLEMS IN THE DEVELOPMENT OF SCI-TECH FINANCE IN ZHEJIANG PROVINCE

5.1 FAULTINESS OF SCI-TECH FINANCE MECHANISM

Even though every region of Zhejiang province has introduced a number of measures and policies to encourage and support the development of science and technology, these activities started at a comparatively late date compared to other provinces and cities.

5.2 WEAK AWARENESS AND ABILITY OF EQUITY FINANCING

The inherent characteristics of technology-based small and medium-sized enterprises and their cautious attitudes towards venture capital is another constraint on the development of science and technology in Zhejiang. Technology-based small and medium-sized enterprises have resistance to venture capital. In their opinion, the negotiations with venture capital are inequality and the founders of the company are not willing to let the venture capital firm control their holdings.

5.3 IMPERFECTION OF THE BANK'S REVIEW MECHANISM FOR LOANS

What hamper the further development of science and technology in Zhejiang province are the existing technical capability of banks in Zhejiang, standards for risk management, interest orientations, and assessment criteria of China Banking Regulatory Commission. The banks are lack of motivation to offer loans for small and medium-sized enterprises and they are inclined to provide services for big customers with small risks. The banks adopt the same loan approval process to all the enterprises, regardless of their different scales. Moreover, the assessment criteria that evaluating performances according to the amount of loans also restrict the orientation of granting loans.

5.4 LIMITED VENTURE CAPITAL INVESTED IN ENTERPRISES IN START-UP STAGES

The technology-based small and medium-sized enterprises in their start-up stages and seed-stages have little chance to raise funds with the help of Angel Investment. Venture capital firms prefer to invest limited funds in high-tech entrepreneurial enterprises which stay in growth stage or maturity stage and have less risks and higher rate of return.

5.5 SHORTAGE OF SCI-TECH FINANCE PROFESSIONALS

Sci-tech finance professionals are essential to the growth and prosperity of Zhejiang Province. There is a great need of high-quality and high-level integrated talents who could master technology, finance, and laws. Not only the development of technology but also the growth of finance should rely on talents who are regarded as the key factors in generating growth of a company and the society. Sci-tech finance professionals, especially the inter-disciplinary talents who are proficient in the management of companies and technology, act as powerful supports to the development of Sci-tech finance.

5.6 LACK OF AUTHORITATIVE INTERMEDIARY INSTITUTIONS

Zhejiang Province is lack in strong intermediary institutions which could render specialized one stop integrated service for companies, banks, and venture capitalists, such as the evaluation and quantization of the intangible assets (intellectual property rights and patent rights), legal services, and financial advisory services. If the authoritative intermediary institutions could evaluate the intangible assets possessed by the technology-based small and medium-sized enterprises and receive the approval of the bank, they would make up for the lack of assessment techniques to evaluate the value of the knowledge and technology, facilitate the companies to obtain the loans, and help banks to retain and develop the high quality customers as well.

6. SUGGESTIONS FOR FURTHER IMPROVEMENT OF THE SCI-TECH FINANCE IN ZHEJIANG PROVINCE

Given that the implementation of the Sci-tech finance is at the municipal level, further refinements have to be made, in spite of these remarkable results in Sci-tech finance of Hangzhou and Ningbo.

6.1 PERFECT THE NINGBO SCIENCE AND TECHNOLOGY FINANCIAL SERVICE CENTER

With the vigorously promotion of the Ningbo government, Ningbo science and Technology Financial Service Center was officially approved to establish in March 2013, which undertook the function of setting up a public docking platform between innovative start-ups and angel investment institutions, providing registration, and guiding the investment of angel capital. However, the center should extend its capabilities to enhance its role in economy development.

First of all, it is important to improve the technology trading center's function of intellectual property transactions. Secondly, it is important to complete the existing technology enterprises library and projects library, considering the mature companies' need for funds and the demands of private equity and venture capital to high-quality firms. Thirdly, technology-based enterprises and venture capital firms should proactively join in enterprises library by submitting their financial data and financing needs for banks and investors to select for investing. Fourthly, integrate the information of financial intermediary services to reduce the searching time and save the costs for small and medium-sized technology-based enterprises, aiming at promoting the healthy and rapid development of them.

6.2 BUILD UP THE GUIDING FUNDS FOR THE TRANSFORMING OF THE TECHNICAL ACHIEVEMENTS

Funds for the transforming of the technical achievements are mainly used to support the transforming of technical achievements that produced by the utilization of fiscal resources, including national (industrial, sectional) Sci-tech programs (special projects, items), local Sci-tech programs (special projects, items), and other new technologies, products, processes, materials, devices and systems innovated by government institutions. In the year of 2011, the Chinese central government set up funds for the transforming of the technical achievements. To carry out the state policies and accelerate the transforming of the technical achievements, Ningbo city took the opportunity to found the transforming funds. Other than that, the government gave assistance to Sci-tech programs(special projects, items) in Ningbo and other new technologies, products, processes, materials, devices and systems innovated by government institutions by the means of granting venture capital investment sub-funds, compensating for loan risks, and rewarding performance.

6.3 IMPROVE THE OPERATION PATTERN OF SCI-TECH BANK

Despite the technology branch of China Bank and Hangzhou Bank have been founded in Ningbo, it is necessary for branches to set up unique management system handling with the assessment of loans, performance appraisal, income assessment, and benefit sharing of technology-based enterprises.

First of all, adjust the decision-making mechanism for loans in Sci-tech bank. Banks' head offices should give the branches more freedom of granting loans. The standard of approval should transfer from the original ways of valuing financial indicators to the comprehensive consideration process in which the commission composed by the banks, technology experts, personnel of venture capital and guarantee company would assess several indicators, such as the development of the whole industry, the companies' prospects, and technological content of the products, to decide whether they would lend a loan. Secondly, change the performance indicators in technology bank and the examination system for staff of the branches, and fix a unique and loose risk tolerance indicator for branches. Based on the enlargement of the risk tolerance indicator, the bank should change the appraisal indicators for staff of the branches, especially these business staff. Instead of following the amount of the loans to evaluate the staffs, the examination system should give reference to the amount of the loan, the number of companies applied for loans, the size of enterprises, and the belonged industry of companies. Thirdly, broaden the profit channel of Sci-tech bank. A new business model should be established to make Sci-tech branch enjoy the revenues of stock option that the venture capital firms obtain from the companies who applied for loans. It achieves the goal of sharing risks and profits and provides an intrinsic motivation for the operation of the technology branch.

6.4 RENEW THE INSURANCE PRODUCTS FOR TECHNOLOGY-BASED SMALL AND MEDIUM-SIZED ENTERPRISES

Insurance types for technology-based enterprises refer to the specialized insurance designs for technology-based enterprises which would effectively reduce the risk of technology-based enterprises in the process of researching and developing, as well as the risks of the bank to grant loans, which relieves the banks' concerns and increases the amount of loans for technology-based enterprises.

First of all, establish performance guarantee insurance. Taking good use of the insurance mechanism to provide insurance for the loans of technology-based enterprises which would rise the companies' credit rating, reduce the banks' risks, and strengthen their willing to issue loans to small and medium-sized enterprises. Secondly, encourage the insurance companies to explore new technological insurance types. Except for the performance guarantee insurance, the government should stir up the insurance companies to explore more insurance products that are suitable for the technology-based enterprises, according to their features of heavy intellectual property and asset light.

6.5 SET UP HIGH S&T CREDIT GUARANTEE COMPANY

Guarantee is the primary means for the commercial bank to undertake lending business. High S&T credit guarantee company dedicated serves for technology-based enterprises to provide security for them. The companies mainly engage in financing guarantees, investment advice, and economic information service. Non-profit high S&T credit Guarantee Company in Hangzhou makes great contributions to the development of science and technology finance.

Technology-based small and medium-sized enterprises have generally little asset. Those start-ups who featured as small size, non-industrialization intellectual, shortage or non-existence of collateral have difficulty in applying for a loan from the bank which lays the crux of financing problem. To solve it, there is a great need to bring the function of security agencies into full play. Nevertheless, commercial guarantee firms primarily hunt for profits and would be reluctant to assume security risks or charge exorbitant guarantee fees for their services. Ningbo should set up high S&T credit Guarantee Company as soon as possible to address the root causes of the financing problems.

6.6 SPEED UP THE PROCESS OF INTELLECTUAL PROPERTY RIGHT PLEDGE LOAN

The companies are generally required to provide collateral for their loans, guarantee companies ask companies to provide object of pledge or hypothecation for counter guarantee which should not be the case for technology based small and medium sized enterprises. The companies could use options, orders or receivable accounts, intellectual property and other objects for guarantees or pledging. Because of the special nature of intellectual property, the government should make a big push towards executing the regulations.

First of all, Intellectual Property Right Pledge Loan should be accompanied with supplementary measures in particular in which the bank, guarantee agencies, assessment institutions, and Sci-tech financial service center are involved. Assessment agencies for intellectual property should be laid special emphasize for the reason that hypothecation and transferring of it would not be implemented without the participation of assessment agencies which have legal qualifications. Recently, none of evaluation reports issued by assessment agencies for intellectual property could be accepted by the bank during the auditing of loans. However, the bank is unable to assess the value of the intangible assets. The reasons mentioned above result in the impossibilities for bank's loan because of the companies' lack of mortgage assets. Therefore, a professional intellectual property assessment agency which has legal qualification should be introduced promptly to aid the evaluation of intangible assets; it also can make up for the bank's assessment to the value of knowledge and technology and help technology-based small and medium-sized enterprises to obtain loans. Furthermore, policies for risk-sharing of intellectual property right pledge loan are needed to ensure that the bank and the policy-oriented guarantee company would share the risks, with the ratio of one to nine.

6.7 PROMOTE LISTING OF TECHNOLOGY-BASED ENTERPRISES

Listing means that the company seeking financing by listing on major domestic stock markets, small and medium-sized enterprise market, growth enterprise market and foreign market. Among more than forty listed companies in Ningbo, there is a few numbers of technological enterprises. The government should cultivate a good environment for the listing of high-tech companies and they can raise capitals through multiple ways, equity and debt, for example.

Firstly, it requires building a platform to cultivate municipal listing companies in science and technology financial service center. The platform is responsible for guiding the work of listing, integrating various of securities, financial intermediaries, laws and accounting firms, establishing service library for expert advisory in listing, and offering advisory services in accordance with the characteristics of the experts. Secondly prepare a special fund to foster the listing of small and medium-sized technological enterprises, promote the reform of them into shareholding enterprises, and encourage them to raise capital through different levels of capital markets. Thirdly, strengthen the training and coaching for the listing of technological enterprises, teach the knowledge of laws and finance to them, and support them with targeted counseling. Fourthly, enhance the communication between listed companies and the ones who are preparing for listing. This kind of interaction would largely help the un-listed companies gain the initiative and avoid detours in the course of listing.

7. ACHIEVEMENTS AND PROSPECTS OF SCI-TECH FINANCE IN NINGBO

These above-mentioned series of policies and measures could promote the union of science and technology, and finance; guiding the financial resources investing in hi-tech enterprises. As predicted, the achievements of relevant Sci-tech finance policies are as follows;

Firstly, the policy would energetically boost the further growth of investment for science and technology in the whole city. On the basis of implementation experience of Hangzhou city, the ratio of amplification for venture capital guiding funds is 1 to 7.6. The amount of venture capital guiding funds in Ningbo is RMB 1 billion, the start-up capital in the initial period is RMB 250 million, and the guiding funds for Angel Investment is RMB 500 million. All these three funds would drive more than RMB 11.4 billion social capitals investing in small and medium-sized technological enterprises.

The launching time of two Technology Branches in Hangzhou is not long enough. Considering their performance and development trends, their customers' amounts are expected to exceed five hundred, and loans for each company would be more than RMB 5 million. There will be more and more creative financial products servicing for technological enterprises. If the Ningbo city learn from the Hangzhou city to set up policy-oriented high S&T credit Guarantee Company that could offer supporting service for Technology Branches, the amplification of funds would be bigger.

Secondly, the output value of hi-tech enterprises would grow even greater. By the year of 2015, the proportion of output value of hi-tech enterprises above designated size in Gross Industrial Output Value is expected to rise approximately to 33% or even higher (the proportion for 2010 is 19.5%). Thus, it can map "Four plus Four" strategic emerging industries in advance, and force the industry of Ningbo to accelerate the development. It is expected that the output value of strategic emerging industries in the whole city would reach to RMB660 billion, and the proportion of increased value in GDP accounts for 16.25% (15%) or even higher by the year of 2015. As a pillar industry, hi-tech enterprises make greater and greater contributions to the whole city's economy. Four dominated strategic emerging industries by using new equipment, new energies, new materials, and new generation of electronic information and four technology-guided strategic emerging industries of marine high-tech, energy saving, environmental protection, and creative design would be vigorously developed and natured. The total number of hi-tech enterprises is expected to maintain 1,100(1000). In addition, the establishment of propulsion mechanism for listing and financing of technology-based enterprises would foster the successful listing of innovative technological enterprises at home and abroad. To the year of 2015, the number of listed hi-tech companies is expected to exceed 50. (The number for 2005 is eight, and twenty-two for 2011.)

Thirdly, technological innovation system would be further refined. Increasing the number of business incubators above the municipal level will provide more opportunities for technological companies staying in its initial stage. Moreover, specific policies support can encourage and flourish the development of innovative enterprise at various stages. Improve the graduation rates of companies in incubators, lower the mortality of start-up companies, and raise the rate of maturity companies' listing. Regarding the construction of R&D institutions, the proportion of R&D institutions built by enterprises above designated size should come up to 15% or even higher. It's expected that the number of above city level key laboratories would be sixty, and the number of national key laboratories would fulfill the zero breakthrough.

Fourthly, speeding up the restructuring and upgrading of industries. Economic growth mode and industry model should be transformed from low-level, labor-intensive, and resource-intensive into high-level, knowledge-intensive, and technology-intensive. Ningbo has limited resources. It only accounts for 40% and 57%.of national average level in per-capita area of cultivated land and the water resource occupation It's necessary to speed up the upgrading of industries to realize the sustainable development of economy, transforming the industry from high energy consumption and high-level of pollution into the resource-conserving and environmentally friendliness.

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