

The Empirical Study of Region Patent Intensive Industries Construction and Contribution to Economy and Employment

Liyang Wang¹, Jiamin Wang¹, Weijia Yu¹, Zong Cai²

¹Zhejiang University of Technology, China Institute for Small and Medium Enterprises, Hangzhou, Zhejiang China

²Hangzhou Kelin Aier Qiyuan Equipment Co. Ltd, Hangzhou, Zhejiang China

Abstract—From the perspective of global economic development and innovation practice, it's important for promoting industrial restructuring and upgrading to gradually increase the proportion of 'intellectual property right (IPR) intensive industries' in the economic structure, turn from relying on intensive labor and resource investment, to relying on intensive intellectual property right (IPR) creation and using, which will push it to the top of the value chains. But what are the structures of intellectual property right (IPR) intensive industries in Region? How does the IPR intensive industries contribute to regional economic growth? Whether forming a virtuous circle from R&D investment to innovation driven? All of them are the key issues in the process of transformation and upgrading of industrial structure. Zhejiang province has a lot of IPR, which makes it rank the forefront of the country. Combined with the characteristics of Zhejiang industry development, carry out regional patent intensive industry division standard and industrial directory, analysis the regional intensive industry structure and its impact on economic and social development, strengthen classification guidance, integrated innovation resources. Then, there are countermeasures and suggestions on promote regional innovation driven strategy through the development of regional patent intensive industries.

I. INTRODUCTION

Intellectual property right (IPR) intensive industries refer to those where the application of IPR by average employee is higher than the industrial average. They mainly include patent-intensive, trademark-intensive and copyright-intensive sectors. Patent refers to the protection of the exclusive rights and interests of the invention originator, and Patent intensive (PI) is concentrated mainly use "patent intensity" to measure, which refers to the amount of patents per capita have, large quantities of patent means it is more intensive. If a certain industry's patents intensity is greater than the overall average, then that industry is classified as patent intensive, we call it patent intensive industry (PII). Available data indicate, in 2012, U.S. IPR intensive industry output value accounted for 34.8% of its GDP, and 25% of its total employment [1]. In 2013, EU's IPR intensive industry output value amounted to 39% of its GDP, and 26% of its total employment [2]. In 2014, China's IPR intensive industry output value reached 26.62% of the country's GDP, and 26.46% of total employment [3], details of the contribution are shown in table 1.

TABLE 1 THE COMPARATIVE OF PII TO ECONOMY AND EMPLOYMENT IN U.S.A, EU AND CHINA

| | U.S.A | EU | China |
|--|----------------------|----------------------|----------------------|
| Number of PII | 13 | 140 | 6 |
| Contribution to Employment (ten thousand) | 2.35%, 714.3 | 10.3%, 2245 | 10.31%, 1452 |
| Contribution to GDP(Billion) | 5.3%, 770 dollars | 13.9% , 1675euros | 10.66% , 8666 RMB |

(Note: China's various data extracted from the study of Jiang Nan, Shan Xiaoguang, director and paint Su "intellectual property intensive type industry of China's economy with the article")

All these suggest that the IPR intensive sector has taken an important strategic position in the economic structure both at home and abroad, and the accumulation and upgrading of the creation, management, utilization and protection of IPR is the inherent demand of industrial restructuring, transformation and upgrading. Faced with the difficult task of achieving innovation-driven growth and industrial transformation and upgrading, the main institutional obstacles hindering economic development and industrial innovation are the problems of technology and economy. The manufacturing sector in Yangtze River Delta as represented by that in Zhejiang, although having seen a drastic rise in the number of IPR, particularly in recent years, is still be set with problems like mismatch of technological input and output, inactive investment market for technological transformation, and less effective knowledge asset agglomeration. This shows that patent intensive industry (PII), as an important support for industrial transformation and upgrading, has yet played its due role in promoting the virtuous cycle of innovation incentives and reinvestment. Exploring the structure of PII, analyzing its contribution to Zhejiang province's regional economic and social development, and perfecting the mechanism of promote its PII development, in order to seek effective ways for industrial transformation and upgrading.

II. THE RESEARCH SUMMARY OF PATENT INTENSIVE INDUSTRIES

A. Comparative analysis of IPR intensive industries

As an IPR power, the United States pays great attention to IPR protection in all aspects of life. IPR is a pervasive feature of the nation's economic operation. As early as in 2013, the country incorporated IPR in the calculation formula of GDP, namely, taking R & D input and expenditure in those original creations of IPR products like entertainment, literature and

arts as assets into its economic accounting system, and keeping close track on their further transformation from economic form to knowledge economy. In 2010 the United States released its first *Joint Strategic Plan on Intellectual Property Enforcement*, stressing the need to assess the economic impact of IPR-intensive industries. Then, in May 2012, the US government released the report *IPR and the American economy: Industry Focus*, aiming to develop quantitative indicators of IPR intensity to deepen the understanding of the key role of IPR in industrial operation. The report explicitly states that to win the future, US needs to strengthen IPR protection to further encourage innovation [1]. Following the United States, the European Patent Office (EPO) and the Office for Harmonization in the Internal Market (OHIM) released the report *IPR Intensive Industry's Contribution to EU Economy and Employment*, providing analysis on overall contribution from various types of IPR industries to the economy of each member state as well as to EU as a whole. It serves as the basis for policy makers in the decision-making and the foundation for enhancing the European citizens' IPR consciousness [2][5]. In 2010, the European Commission announced the EU economic development plan for the next decade, namely *EU 2020 Strategy*, which sets the goal to create an economic entity with a more competitive economy and higher employment. The Strategy points out the vital importance in promoting the "virtuous circle" from R & D investment to employment through innovation, competitive advantage and economic success. What's more, Gavin Murphy indicate that stricter employment protection legislation led to lower innovation intensity industries with a higher job reallocation propensity [6].

In recent years, China has attached great importance to the development of IPR. To study the structure and distribution of the country's regional patent intensity industry and understand its economic characteristics, growth pattern and contribution to the national economic and social development, China State Intellectual Property Office (SIPO) conducted a national statistical campaign. Based on research methodology of the United States and the European Union, it carried out separate surveys in tertiary industries, major industries, industrial categories and industrial sectors. It pointed out in the *China's Regional Industry Patent Intensity Statistics Report*, released in December, 2013, that currently China's patent intensity has increased at a faster pace and the industry has achieved a wider coverage, generated remarkable economic benefit and showed powerful locomotive function. The sector is also characterized by a concentration of innovative elements, strong foreign trade competitiveness, highly labor-intensive and a steady trend to transformation and upgrading [7]. The SIPO's report has linked patent statistical data with that of the national economy, making the

survey result highly valuable, and rendering it a critical guidance for the development of regional IPR strategy all over the country. But with regard to the planning of the regional IPR intensive industry, neither the report nor the current academic research is specific enough. At present there is an acute lack of research on regional IPR intensive industry. Against a background calling for innovation-driven growth, regional economic and social development is in an urgent demand for capacity improvement for IPR system-led independent innovations. With the acceleration of mode transformation of economic development the as the main focus, strengthening IPR's guiding role in the regional economy and turning it into the new driver is an inevitable trend in the development of regional economic society. In addition, the IPR-intensive industry yields high contribution to the economic community. With enhanced planning and guidance, it will play an even greater role in regional economic and social development. In light of this, some areas have already initiated studies of IPR-intensive industry. For example, in April 2014, in *Further Implementing the Capital City's IPR Strategic Action Plan (2014-2020)*, Beijing proposed to carry out PII survey and formulate related policies; in the provincial government meeting held in November 2014, in addition, Zhejiang, Shanghai and Guangdong have also rolled out similar schemes. Zhang Jun selects patent-intensive industries in Jiangsu Province as the research object and analyzes the efficiency of those industries based on DEA-Malmquist method, and the results show that total factor productivity of patent-intensive industries in Jiangsu maintains the upward trend [8]. What's more, Fu Yanlei found that the patent intensive industry in Huzhou is mainly distributed in traditional industries, and shows distinct geographical features [9] [10].

B. The comparative analysis of the construction methods of patent intensive industries

Some Chinese and overseas scholars and government institutions adopt the concept of "patent intensity" or "patent density" to classify PII. Although there are still differences in standards, they invariably use the same methodology, i.e. measure the overall average value of the patent intensity (or density) of all the industries involved, and then calculate separately the patent intensity (or density) of each industry. If the result of a certain industry's patents intensity (or density) is greater than the overall average, then that industry is classified as patent intensive. Moreover, after identifying a specific PII by survey, these scholars and government institutions tend to link it with the current economic development and employment of countries concerned. And based on that, further study is carried out on its contribution rate. Details of the construction are shown in table 1.

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TABLE 2 COMPARISON OF THE CONSTRUCTION METHODS OF PATENT INTENSIVE INDUSTRIES

| Scholars and Institutions | Purpose | Construction Method |
|--|--|---|
| Albert G.Z. and Hu, I.P.L. Pn[10] (2009.2) | The relationship among the patent intensity, patent protection, and economic growth of multinational organizations in manufacturing industry. | Patent intensity: Calculated by the average number of patents in an industry divided by the average value of industry sales. |
| Jade Vichyanond [11] (2009.11) | Study how to patent influence the industry, and consider the dependence of each industry on patent protection | Patent intensity: the logarithm function of the square root of patent citation frequency summation and the industry average output value. |
| U.S. Patent and Trademark Office (2012.5) | Determine the patent intensive industries. And study the contribution of patent intensive industries on employment, GDP, wages, trade, etc. | Patent intensity is higher than the average as patent intensive industries |
| EU Patent Office (2013.9) | Study the contribution of IPR intensive industries to the EU economy in terms of output, employment, wages and trade. | Patent relative intensity higher than the overall employment weighted average of the industry is identified as patent intensive industries |
| National Intellectual Property Office (2013.12) | In order to find out the industrial structure of regional patent intensity in our country, to explore its contribution to the national economic. | Invention patent density above average level is identified as the high invention patent intensive industries |
| Xu Ming and Jiang Nan [12] (2013.2) | The concept of "industry patent density" is used to analyze the 230 industries, and then study the 9 factors of human capital investment, fund, and research activities. | Patent density is higher than the average industry patent density industry is identified as patent intensive industries |
| Xu Ming and Jiang Nan[13] (2013.4) | The concept of "industry patent intensity" is used to analysis the 230 industries in China, and found there are three important factor to PII. | Patent density is higher than the average industry patent density industry is identified as patent intensive industries |
| Jiang Nan, Dan Xiaoguang, Su Qi [3] (2014.8) | Study economic and employment contribution value and contribution rate of intellectual intensive industries during the period from 2008 to 2010. | Using the above mentioned four ways (method from U.S. Patent and Trademark Office, Singapore scholar Hu and PNG, American scholar Jade Vichyanond and Chinese scholars Jiang Nan) to joint identify China's patent intensive industries |

III. THE EMPIRICAL STUDY ON THE CONSTRUCTION OF PATENT INTENSIVE INDUSTRIES AND THE CONTRIBUTION OF ECONOMIC AND EMPLOYMENT IN ZHEJIANG PROVINCE

With economic globalization, the core driver for regional sustainable development is industrial innovation, whose goal is to promote industrial structure upgrading and enhance industrial competitiveness. Industrial innovation depends on the IPR accumulation of the related industry and the capability of integrating IPR resources in and outside of the region. Therefore, industrial innovation needs the incentives and protection of IPR system, the embedding of IPR strategy into the whole process of independent innovation, and the integration of IPR with industrial technology [14]. As a province with both relative short innovation resources and disadvantageous industrial structure, it is paramount for Zhejiang to adopt the innovation-driven development strategy and promote industrial transformation and upgrading to boost its core competitiveness. At present, Zhejiang has become a big IPR owner, with its patent ownership ranking top in the country. By formulating PII standards and industry catalog, and analyzing its economic contribution, development differences and existing problems, better proposals can be put forward to improve patent intensive industrial development, strengthen systematic guidance, and integrate innovation resources. Therefore, an empirical study of Zhejiang PII structure as well as economic and employment contribution is of typical significance.

A. Construction method and industry catalog of patent intensive industry in Zhejiang Province

Integrating the research methodology of the US, EU and SIPO, we define a patent -intensive industry as one whose patent intensity (total invention patents granted/ quantity of employment average) to be higher than that of the overall average. As a supplementary measurement, we also do screening based on the total patents granted in that industry. Because in some industries, only a small number of patents are granted, hence, the corresponding employment is extremely low. So the resulting patent intensity comes to be quite high. However, in fact such kind of industries are hardly patent-intensive in a true sense.

Combining the data from the *National Economic Industrial Classification* (GB/T4754-2011), *China Labor Statistical Yearbook*, *Zhejiang Statistical Yearbook* and those provided by Zhejiang IP Office, and based on the analysis of the patent, industrial economic and employment data in Zhejiang during the seven years of 2007 to 2013, we define those industries with a patent intensity higher than average industrial patent intensity during all the three five-year cycles as high patent-intensive, those higher in two five-year cycles as medium patent intensive, and those only in one five-year cycle as low patent intensive. By such classification, eight patent intensive industries are identified in Zhejiang. Four of them are high patent-intensive: special equipment manufacturing, instrument and meter manufacturing, chemical raw materials and chemical products manufacturing, and pharmaceutical manufacturing; one medium: general equipment manufacturing; and three lows: metal products manufacturing, computer, communications and other electronic equipment manufacturing, and non-metallic mineral products. Details are shown in table 3.

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TABLE 3 THE CATALOG OF PATENT INTENSIVE INDUSTRIES OF INDUSTRIAL DIVISIONS IN ZHEJIANG PROVINCE (PATENT INTENSITY: PARTS PER THOUSAND PERSON)

| Items of Industry | 2009-2013 Years of Patent Intensity | Patent Intensive Industries | 2008-2012 Years of Patent Intensity | Patent Intensive Industries | 2007-2011 Years of Patent Intensity | Patent Intensive Industries | Category |
|---|--|-----------------------------------|--|-----------------------------------|--|-----------------------------------|----------|
| Average of 41 industrial divisions | 23.663 | - | 24.613 | - | 8.49 | - | - |
| Special equipment manufacturing industry | 64.7009 | √ | 52.5756 | √ | 42.0503 | √ | High |
| Instrument and meter manufacturing industry | 55.4263 | √ | 48.1836 | √ | 37.8210 | √ | High |
| Chemical raw materials and chemical products manufacturing | 51.5062 | √ | 41.3807 | √ | 31.6328 | √ | High |
| Pharmaceutical manufacturing industry | 37.5011 | √ | 35.4957 | √ | 32.1210 | √ | High |
| General equipment manufacturing industry | 26.7129 | √ | - | - | 17.6414 | √ | Medium |
| Metal products industry | - | - | - | - | 13.1026 | √ | Low |
| Computer, communications and other electronic equipment manufacturing | - | - | - | - | 14.3065 | √ | Low |
| Non metallic mineral products industry | - | - | - | - | 9.8930 | √ | Low |

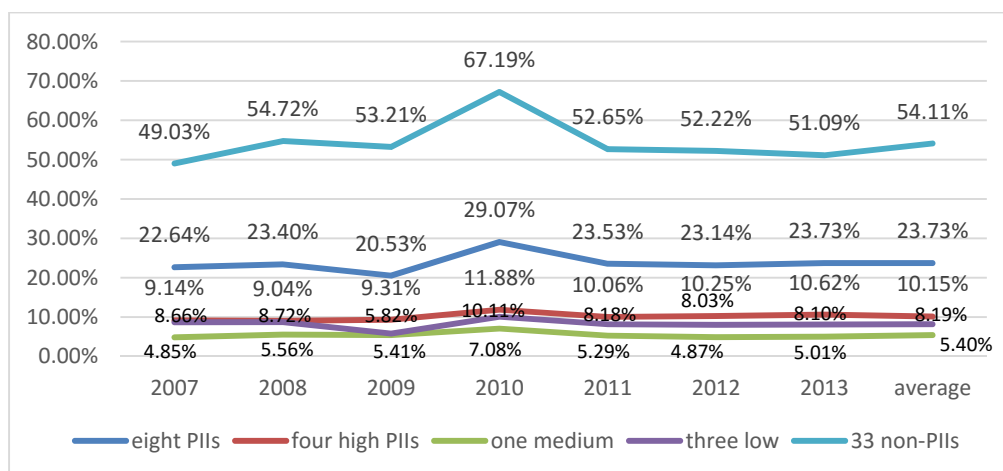


Chart1 Comparison of the contribution of all kinds of patent intensive industries to the whole industry of Zhejiang Province

B. The empirical study on the contribution of the patent intensive industries in Zhejiang Province

Based on gross output value of each industry from *Zhejiang Science and Technology Statistical Yearbook*, we made analysis of the economic data from enterprises above designated scale between 2007-2013, and come up with average gross industrial output value of the eight PIIIs (1.450241 trillion yuan). When comparing them with the average gross output value of 96 major categories of the whole industry (\$6.110222 trillion) during these 7 years, we found that the eight PIIIs contributed 23.73% of the entire industrial output value. Among them, the four high PIIIs accounted for 10.15%, one medium 5.40%, and three low 8.19% (see Chart 1). The eight PIIIs have shown an upward trend in contribution since 2009 and even reached 29.07% in 2010.

With reference to the reports from U.S. and EU, we made research on the contribution by the PII to employment. Using data on the average employment in enterprises above

designated size between 2007-2013(see Chart 2), we learn the average employment of eight PIIIs to be 2.273159 million. Comparative analysis was also carried out between these eight patents intensive industries (i.e. four high patent - intensive, one medium and three low) and 33 non-PIIs of the province in terms of contribution to the province's employment.

A comparative study is made between the following data: the average employment (2.273159 million) created by Zhejiang's eight PIIIs in the seven years of 2007-2013 and the average employment (35.99089 million) in its 96 major categories of industries during the same period. We find that the eight industries generated 6.32% of total employment. The contribution from the four high patent intensive, one medium high and three low to the total industrial employment comes respectively to 2.01%, 1.82% and 2.49%. The three's contribution curves overlap in places, indicating that their contribution rates are quite well matched. On the whole, there are variations year on year, but only to a limited extent.

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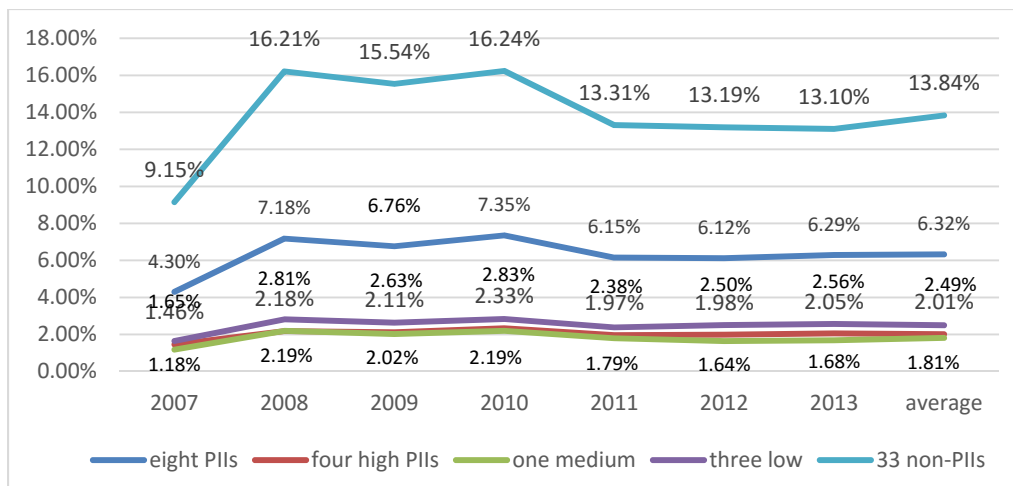


Chart 2 Comparison of the contribution rate of all kinds of patent intensive industries to the province's employment

C. Innovation investment of patent intensive industry in Zhejiang Province

The innovation input consists of two parts, one being the R&D funds input intensity (ratio of R&D internal budget expenditure in major business income), the R&D personnel input intensity (ratio of R&D personnel in total employment) [15]. In terms of R&D investment intensity, during 2007-2013 (see chart 3), Zhejiang's four high PIIIs show a R&D fund

input intensity basically higher than their medium and low counterparts, with 2007 seeing the greatest intensity in R&D spending.

In 2007-2013, the eight PIIIs in Zhejiang spent far more in R&D budget than the 33 non-patent intensive ones (see chart 4). Looking at the average value of the seven years, PIIIs display intensity 0.9% higher than non patent intensive businesses.

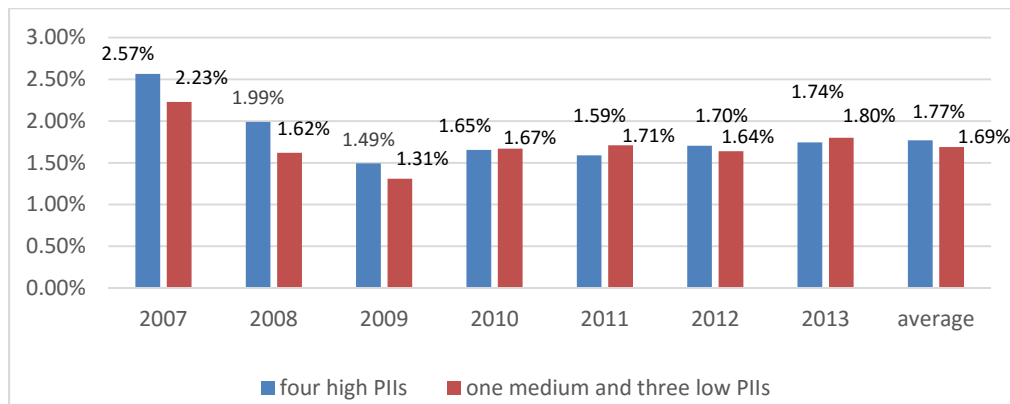


Chart 3 Dynamic comparison of R&D funds input intensity among high, medium and low patent intensive industries in Zhejiang Province

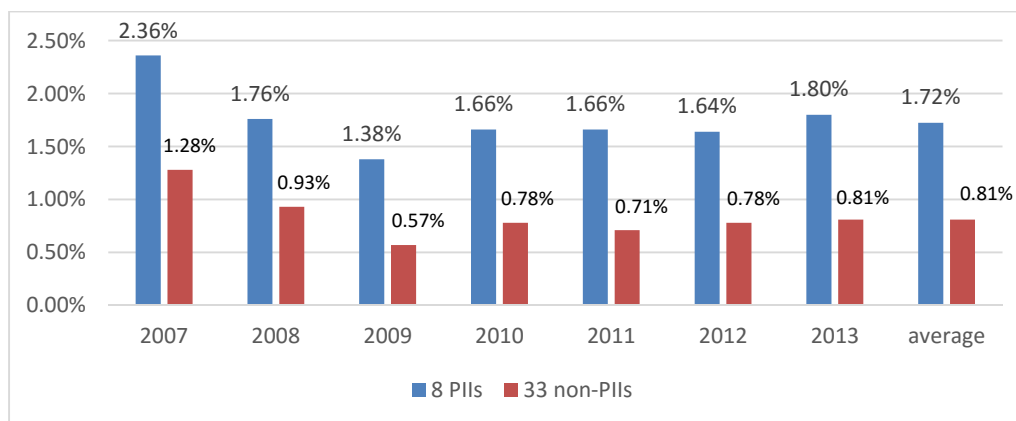


Chart 4 Dynamic comparison of R&D funds investment between 8 PIIIs and 33 non-PIIIs in Zhejiang Province

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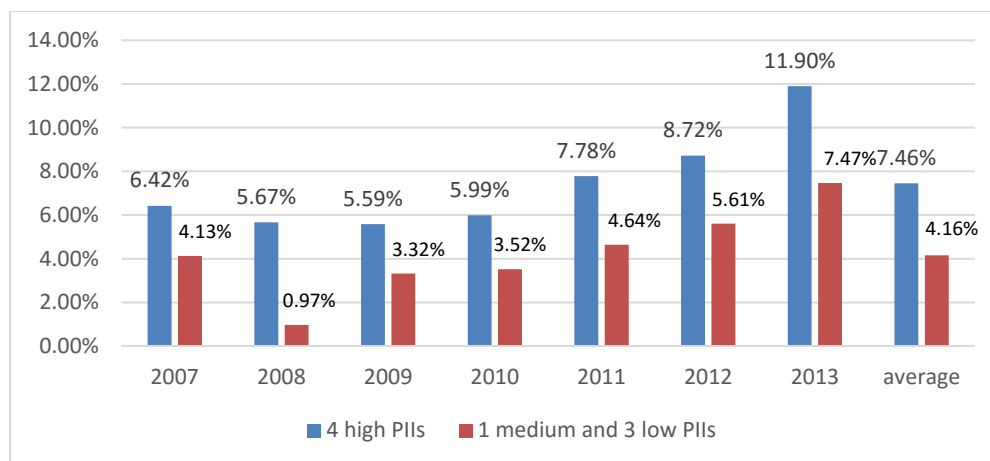


Chart 5 Dynamic comparison of R&D personnel input between 4 high PIIs and other PIIs in Zhejiang Province

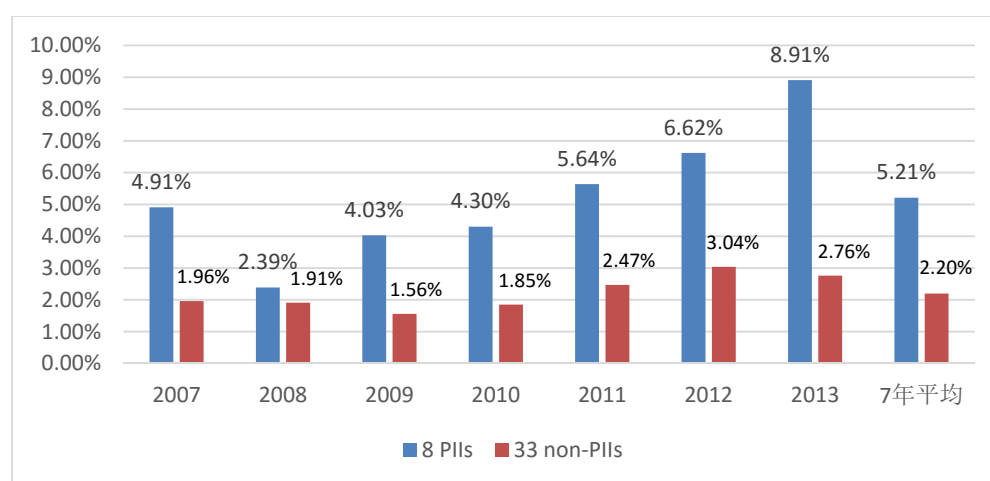


Chart 6 Dynamic comparison of R&D personnel input between 8 PIIs and 33 non-PIIs in Zhejiang Province

Viewing from the proportion of employed R&D personnel, in 2007-2013, Zhejiang's high PIIs register a greater input than their medium or low counterparts (see chart 5). With the exception of 2008 which came under the impact from the economic crisis, the R&D personnel input intensity shows a trend of rising year by year from 2009 on wards. The year of 2013 saw a R&D personnel input 4% higher in high patent intensive industries than medium and low ones.

During 2007-2013, Zhejiang's eight PIIs show a higher R&D personnel input intensity than 33 non-patent-intensive ones (see chart 6), with the largest difference in value in 2013, amounting to 6%. Judging from the seven-year average value, PIIs register 3% higher input intensity than non-PIIs.

IV. THE COMPARATIVE STUDY ON THE CONSTRUCTION OF PATENT INTENSIVE INDUSTRIES AND THE CONTRIBUTION OF ECONOMIC EMPLOYMENT IN CHINA AND ABROAD

From 2007 to 2013, Zhejiang's eight PIIs made a contribution of 1.45 trillion yuan to the province's gross industrial output, accounting for 23.73% of the total; they

provided nearly 2.27 million jobs, or 6.32% of the total employment. This shows that PIIs in Zhejiang have achieved outstanding economic benefit, and their locomotive role is growing steadily. Among the province's eight PIIs, four are high, one medium and three low. After survey and calculation, SIPO identifies 11 industries of this category. The US recognizes 13 industries to be patent intensive while 140 industries are deemed in EU as such.

By comparison, we found Zhejiang's eight PIIs are similar to those recognized by the US, EU and China's official reports, which indicates that Zhejiang's patent intensive sector has developed much in line with the direction of general national development and gained early competitiveness. But the comparative study also reveals that PII growth in Zhejiang is beset with following deficiencies: industry coverage tends to be concentrated, and non-PII has relatively large share. There is a need to step up efforts in cultivating PIIs, and promote the transformation from low PII to the high. In US, EU and SIPO reports, semiconductor and other electronic-components-related industries are all identified as patent-intensive, but the industries concerned in Zhejiang do not possess the patent-intensive characteristics.

2016 Proceedings of PICMET '16: Technology Management for Social Innovation

TABLE 4 COMPARISON OF THE UNITED STATES, EUROPEAN UNION AND CHINA PATENT INTENSIVE INDUSTRIES (PATENT INTENSITY: PARTS PER THOUSAND PERSON)

| Serial Number | Industry Name | U.S.A | EU | China | Zhe Jiang Province |
|---------------|--|-------|--------|-------|--------------------|
| 1 | Computer and other electronic equipment | 277.5 | 5.736 | 649.6 | 14.307 |
| 2 | communication equipment | 264.8 | 9.35 | | |
| 3 | Semiconductor and other electronic components | 111.6 | 8.515 | 158.0 | - |
| 4 | Other computer and electronic products | 108.5 | - | 463.5 | - |
| 5 | Navigation, measurement, electronic medical and control instruments | 96.1 | 13.349 | - | - |
| 6 | Basic chemical products (chemical raw materials and chemical products manufacturing) | 80.2 | - | - | 51.506 |
| 7 | Electronic equipment, instruments and components | 54.3 | - | 513.9 | - |
| 8 | Pharmaceutical and pharmaceutical (pharmaceutical manufacturing) | 46.8 | 27.569 | 395.9 | 37.501 |
| 9 | Other manufacturing | 37.5 | 2.481 | 402.3 | - |
| 10 | Other chemicals and chemicals | 32.4 | 19.080 | - | - |
| 11 | Medical equipment and supplies | 32.0 | - | 953.2 | - |
| 12 | Mechanics | 31.6 | - | - | - |
| 13 | Resin, synthetic rubber and synthetic fiber | 26.0 | 1.801 | - | - |
| 14 | Special equipment manufacturing industry | - | 60.37 | 301.5 | 64.701 |
| 15 | Instrument and meter manufacturing industry | - | 27.02 | 225.1 | 55.426 |
| 16 | General equipment manufacturing industry | - | 109.74 | 220.9 | 26.713 |
| 17 | Metal products industry | - | 9.56 | - | 13.103 |
| 18 | Non metallic mineral products industry | - | - | - | 9.893 |

(Note: Chinese data extracted from the State Intellectual Property Office "China regional industry patent intensity statistics report in 2008-2012 statistics; numbers 1-13 to industry name according to the NAICS industry classification codes, serial numbers 14-18 for industry name according to the classification of national economic industries.)

That means that in Zhejiang, the information industry's transformation and upgrading is still insufficient. More IPR-related work needs to be done to boost the information industry development, so it can be forged into a PII. There is also imbalance in regional development and insufficient policy support. Supportive measures, specifically for PIIs, remain to be enhanced; there is a need to vigorously stimulate enterprise's motivation for innovation. Details are shown in table 4.

V. CONCLUSION

Take Zhejiang Province as an example, this study finds that there are eight patent intensive industries in Zhejiang. Four of them are high patent-intensive (special equipment manufacturing, instrument and meter manufacturing, chemical raw materials and chemical products manufacturing, and pharmaceutical manufacturing), one medium (general equipment manufacturing), and three lows (metal products manufacturing, computer, communications and other electronic equipment manufacturing, and non-metallic mineral products). Otherwise, In 2007-2013, the eight PIIs in Zhejiang spent far more in R&D budget and R&D personnel input intensity than the 33 non-patent intensive ones. This study also find that from 2007 to 2013, Zhejiang's eight PIIs made a contribution of 1.45 trillion to the province's gross industrial output, accounting for 23.73% of the total; they provided nearly 2.27 million jobs, or 6.32% of the total employment. This shows that PIIs in Zhejiang have achieved outstanding economic benefit, and their locomotive role is growing steadily.

To implement innovation-driven development strategy, promote industrial transformation and upgrading, it is necessary to gradually increase the share of "PIIs" in the economic structure, and realize the transfer from relying on intensive labor and resources input to relying on the intensive IPR creation and application, pushing industrial development towards the high-end of the value chain.

A. Strengthen planning guidance and dynamic monitoring of PIIs, and improve its overall layout and coordinated development

Studies by researchers indicates that from the perspective of static, there was a "functional trap" and "short board"; from the perspective of dynamic, it was outstanding in the rising situation in all industries, nevertheless, the growth degree was significantly different for industries^[13]. So strengthening the cultivation of PII is beneficial to accomplish industrial transformation and upgrading, and promote sustainable economic growth. It can be implemented in the following aspects: firstly, based on the 13th Five Year Plan and *Manufacturing 2025*, research and publicize regional PII catalog, formulate PII development plan, and carry out classified guidance; Secondly, focus on cultivating PIIs that support "smart manufacturing" and "Internet +", enhance the low patent intensive industries' ability to create and apply IPR, and achieve the transformation and upgrading of related industries; Thirdly, establish a dynamic PII monitoring system, track the international development trend and characteristics in the field, and make orderly adjustment to industrial layout and optimize industrial structure; Fourthly, conduct scientific analysis of PII's contribution to economic growth, and guide step by step PIIs in integrating

innovation resources to promote industrial transformation and upgrading for economic sustainability.

B. Set up PII special growth funds, and guide the patent intensive industries in marketization

The regional PII have begun to take shape, thanks to a series of policy support China has recently rolled out to encourage intellectual property creation. Against the policy background of innovation-driven growth and industrial transformation and upgrading, PII not only has brought more innovative products, but also played an ever increasing driving role in promoting economic growth. With the annual increase in the number of patents, the national and regional policy priorities will gradually turn to encourage the transfer of patent to productivity, and more emphasis will be given on the quality of patent indicators and economic value. To guide PII in marketization, the following specific measures are to be taken: firstly, perfect laws and regulations, fiscal and tax policies that support industrialization and marketization of patent intensive products; Secondly, develop comprehensive trading platform geared to promote the patent operation, and create new patent commercial mode and operation mechanism in patent information, operation, agency and finance, etc.; Thirdly, construct patent operation market regulatory system, make full use of big data and Internet + to realize the embedding and interaction among the patent administrative authorities, credit department, electronic platform and the whole society and, create an efficient patent operation market environment with dynamic monitoring, credit support and complete supervision.

C. Strengthen the training of compound talents in IPR, improve the skills of PII employed persons

In the context of innovation driven development strategy, all aspects of innovation, can not be separated from IPR inter-disciplinary talents. It's very important to strengthen the cultivation of IPR inter-disciplinary talents. Efforts are to be made to train professional personnel in different fields such as law, technology, economy, management, information and foreign language, etc. Encourage universities to set up R&D institutions in enterprises, promote industry-university-research talents exchange; strengthen the professional skills and IPR training of employees from PII, and cultivate more learning- and intelligent-type staff.

D. Carry out the construction of PII public service platform and industrial development experimental zone to give full play to the agglomeration effect of PIIs

With the improvement of the patent protection awareness and deepening participation in the international division of labor, there will be growing demand for patent public services. The building of PII-oriented public service platform can give full play to the agglomeration effect of patent intensive industries. For this purpose, specific measures are to be taken as follows: firstly, speed up the construction of internet-based patent public service platform, promote the

integration of big data from PIIs with the data from economic, technological, financial, and industrial sectors, provide early warning and navigation to PIIs, improve their planning and decision-making competence. Secondly, rely on high-tech industrial park and independent innovation demonstration areas in building and developing PII test zones. Rely on the industry's internal enterprise patent agglomeration effect to promote the technological transfer investment, R&D innovation, attract and carry out trading of patent intensive assets, and create new PIIs. Thirdly, provide diversified patent service channels, and explore to set up socialized and professional patent intermediary institutions featuring resource sharing, public participation in entrepreneurship and investment, and benefits sharing, and strengthen their role in technical advisory, patent assets assessment, patent information dissemination and legal services.

E. Pay attention to the planning and guidance of weak PIIs, gradually perfect the overall layout and coordinated development of regional PIIs

In order to optimize the structure of regional PIIs, in light of the regional industry development characteristics, appropriate development medium and low PIIs can be pursued. Furthermore on the basis of regional development goals and innovation-driven strategy, efforts are to be spent on cultivation and conversion of part of the non-patent intensive industries. Through the planning and guidance, these weak patent intensive industries and non patent intensive industries with important strategic significance can be converted into strong patent intensive industries, Which can optimize the overall layout of the manufacturing industry, and promote coordinated development with various industries.

F. Establish PII concentrated area, and promote sustained and healthy development of strategic emerging and the high tech industries

Set up the PII concentration area, formulate corresponding industrial support policy, for example by increasing the proportion of research spending in fiscal expenditure to strengthen the "legally-binding augment" of R&D input, optimize the structure of fiscal R&D spending, guide innovation resources to concentrate in PIIs that meet the strategic demand, strive to improve the intensity of PII, and strengthen support from the financial fund to enterprises-guiding industrial patent pool and patent portfolio, promote the patent transformation from quantity and speed types to quality and benefits types. Thirdly, accelerate the implementation of related policies to build a pro-innovation system environment, including measures such as expanding the coverage of value added tax preferential regime, and adopting a policy of low value-added tax rate son the patent intensive enterprises; comprehensively implement R&D costs deduction policy, allowing companies to set up independent

projects to benefit from it; intensify patent protection, upgrade efficiency and convenience of patent administrative and judicial relief. Fourthly, improve IPR strategic management level, guide large and medium-sized enterprises to establish IPR organizational structure, formulate enterprise IPR strategy; Help small and micro enterprises implement the IPR trust and enhance their IPR management level.

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