Research Report

Improvements of Intellectual Property Policies in China: Based on the Inspiration and Reference from Japan

by

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Certification Page

I, LIN Jie (Student ID 51217602) hereby declare that the contents of this Master's Thesis / Research Report are original and true, and have not been submitted at any other university or educational institution for the award of degree or diploma.

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LIN Jie
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Summary

Although China has already been an economic power, China still needs economic restructuring, industrial structure upgrade adjustment to avoid falling into the "Middle Income Trap". The measure of improving the enforcement of intellectual property rights contributes to escape from Middle Income Trap. This measure is to attract professionals and enterprises to engage in creation and innovation, increase social productivity and labor efficiency, and ultimately improve the country's capacity for innovation. Chinese government has always attached importance to intellectual property system and has issued important policies about intellectual property system. The government can support the technological innovation of enterprises through various macro IP policies.

Japan is internationally recognized as one of the countries who escape from "Middle Income Trap" successfully. The most indispensable measure to escape from “Middle Income Trap” in Japan was also to successfully perform an economic development model transformation, especially move from imitating and importing foreign technologies to innovating technologies of their own.

Therefore, my research question was: based on the references and lessons of Japan's practices, What China can learn from Japan so that China could promote

development of innovation, finally move technologies from imitation to innovation? on the basis of my research, I took real situations of China into consideration and made some recommendations to Chinese IP policies.

This report targeted intellectual Property (IP) policies for Small and Medium-Sized Enterprises (SMEs) in both China and Japan as research object since SMEs are the main force of innovation and Japan is the country where SMEs make the most contribution to the national economy. In the first place, this report analyze existing challenges and difficulties had faced by SMEs in the application and management of IP. After that, this report found out that four categories of policies were provided to support SMEs by Japan Patent office (JPO) and State Intellectual Property Office (SIPO) in China. That were IP support policies for SMEs' R&D, patent application, patent examination and oversea activities. And then this report compared the similarities and differences in the implementation of above four categories of policies between the two patent offices and summarized the pros and cons of the policies. At last, based on the result of comparison, this report would put forward some possible advices or solutions to conquer SMEs' IP challenges in China in order to facilitate innovation of SMEs finally.

There are four categories of recommendations for China. Firstly, it's about patent information analysis system. It's better for SIPO to provide some practical patent information analysis for SMEs. Secondly, it is about money incentive for patent

application. It might be better for China to adopt Japanese selective support in money incentive, especially supporting R&D type SMEs. Thirdly, when it comes to IP policies support for patent examination. SIPO's current practice is suitable for Chinese conditions. Fourthly, SIPO could subside SMEs' oversea patent application and then raise the consciousness of global IP management and implementation.

In conclusion, SIPO has to offer effective supports for SMEs from technology, money, time and oversea market perspectives, which are vital for SMEs' flourishing.

Key Word: Middle Income Trap, Intellectual Property, SMEs, Policy Support, JPO, SIPO

Chapter 1 Introduction

1.1 Research Background

1.1.1 Middle Income Trap

Since "Reform and Opening up" in 1978, China's economic development has been greatly changing, not only historically eliminating poverty, but also successfully leaping to the ranks of the world's economic powers. The economic aggregate is in the second place in the world. By 2016, China's GDP (National Bureau of Statistics of the People's Republic of China, 2017) was 74.4127 trillion-yuan, per capita GDP in China reached 53980 yuan.

Although China has already been an economic power, it is still not a strong economic power. China's economic development has chief characteristics of large scale, low per capita, high consumption but low technology. Chinese economy's unbalanced, uneven, non-sustained, uneconomical coarse features are very obvious (Kenneth Keng, 2006). Faced with such problems, transformation and upgrading of China's economy is the only way to be stronger. China needs economic restructuring, industrial structure upgrade adjustment, to avoid falling into the "Middle Income Trap".

What is "Middle Income Trap"? How could China avoid falling into “Middle Income Trap”?

The term “Middle Income Trap” was presented by Gill and Kharas (2007) to describe apparent growth slowdowns in many former East Asian miracle economies. It refers to that some countries are stuck in a period of stagnation in economic growth after the GNI per capita reaches middle-income level. According to the latest classification threshold of the World Bank (2017), the World Bank divides the countries of the world into four groups based on their GNI per capita: low-income countries (less than $1005), lower-middle-income countries ($1006 to $3955), upper-middle income countries ($3956 to $12,235) and high-income countries (above $12,235). For a long time, these middle-income countries cannot successfully move up to the ranks of high-income countries. It also means that a country has developed to the middle-income stage, there may be two kinds of consequences: on the one hand, the country keeps on developing sustainably and gradually becomes a developed country. On the other hand, the emergence of the disparity between the rich and the poor, environmental degradation and even social turmoil and other issues, will hinder economic development. The latter is called in " Middle Income Trap".

In the postwar era, many countries rapidly developed and reached the middle-

income status, but few of them moved up to the high-income status. The majority of countries in the developing world have the so-called "Middle Income Trap" problem. For example, many countries in the Middle East and Latin America reached middle-income status as early as the 1960s and 1970. But so far, many of them are still there, even in Latin America, income per capita relative to the United States decreased dramatically from 1960 to 2005. Besides, economic growth in many Middle Eastern and North African countries remained stagnant and struggled with high unemployment, social and political turbulences (Agénor, Canuto, &Jelenic, 2012).

According to figures from the World Bank, the GNI per capita of China in 2010 was 4,340 U.S. dollars which has reached the upper-middle income level according to the country classifications by income level of World Bank in 2010. Some pessimists said that China will inevitably fall into “Middle Income Trap” and the growth rate of GDP will slow down as well.

According to Agénor, Canuto and Jelenic (2012), some public policies could be adopted by developing countries to escape from Middle Income Traps. Such measures include developing advanced infrastructure particularly in high-speed communications networks, improving the enforcement of intellectual property rights and reforming labor. Among all three measures mentioned before, the key measure is to attract professionals and enterprises to engage in creation and innovation, increase social productivity and

labor efficiency, and ultimately improve the country's capacity for innovation. Fundamentally, the success of transiting from middle-income to high-income level is to push the technological advances and move from imitating and importing foreign technologies to innovating technologies of their own. Strengthen intellectual property rights' protections have been a major factor in facilitating the home-grown innovation.

1.1.2 The significance of Innovation

The experience of modernized developed countries shows that the momentums of a country's economic and social development is mainly divided into factor-driven, investment-driven, innovation-driven, wealth-driven and other types. Factor-driven refers mainly to the land, resources, labor and other factors of production investment, access to development momentum, promote economic growth, it is generally adapted to the lack of scientific and technological innovation in the early stages of modernization. Due to the constraints of natural resources and other conditions, relying solely on this development momentum to achieve economic growth, often produce environmental pollution and ecological damage and other issues.

Investment driven refers to access to economic and social development of a powerful driving force by the continued high investment and high capital accumulation. Practices show that high investment and high capital accumulation cannot be sustained forever. When the economy and society develop to a higher stage, this investment-

driven development model is unsustainable. Innovation-driven means that the economic growth mainly rely on science and technology innovation, through technological change to improve productivities of production factors, in order to achieve intensive growth mode, the most reasonable and effective economic and social sustainable and healthy development. Innovation is the most promising source of development. Innovation is the first driving force to develop.

Innovation is the world's trending. The global new round of scientific and technological revolution, industrial change and military reform is now accelerating the evolution of scientific exploration from the microscopic to all aspects of the scale to expand in depth. With intelligent, green, vast-shaped characteristics of the group of technological revolution will lead to major adjustments in the international industrial division of labor. Subversive technology continues to emerge. All things above are reshaping the world's competitive landscape, changing the national power contrast. Nowadays, innovation-driven is the main strategy in many countries to seek competitive advantage.

1.1.3 The Relationship between Innovation and Intellectual Property (IP) system

Technological innovation is the source of IP system and IP system is the driving

force of technological innovation. IP system grants the innovators or inventors patent right within a certain geographical scope, a certain period of time, to make their exclusive market share of scientific and technological achievements and economic benefits. Once the patent right is infringed, innovators or inventors can use the rights conferred by Patent Law to protect its own interests. Effective protection of intellectual property and rich market returns will surely inspire and motivate people to engage in scientific and technological innovations and attract a large number of individuals and enterprises to actively participate in scientific and technological innovation activities. The acquisition of economic benefits enables individuals and enterprises not only to earn back the initial investment, but also to be able to continue with the new round of inventions and innovations, thus bring the technological innovation to a virtuous circle (XUE, 2009). In conclusion, intellectual property system could facilitate innovation.

There are two quite vital elements to stimulate innovation: technology and intellectual property system. On the one hand, these two elements should coordinate with each other, promote each other and play their role sustainably. Innovation is, first and foremost, about innovation in science and technology, strengthening scientific exploration and making technological breakthroughs. On the other hand, the whole chain intellectual property system of creation, protection, utilization and management should be constructed to optimize the innovation and entrepreneurial environment, promote the application and utilization of innovations, achieve economic income by

making use of innovations, strengthen the innovation protection, raise the awareness of the whole society and finally promote the innovation.

Chinese government has always attached importance to intellectual property system and has issued important policies about IP system. On October 15, 2007, Chairman Hu Jintao made clear in his report to the 17th National Congress of the Communist Party on "Implementing Intellectual Property Strategy." June 5, 2008, the State Council released "National Intellectual Property Strategy Outline." On December 22, 2015, the State Council promulgated the "Several Opinions of the State Council on Accelerating the Building of a Powerful Intellectual Property Power under the New Situation. "Since the implementation of the national intellectual property strategy in 2008, the number of Chinese patent applications has risen year by year and China has become a big intellectual property country. However, the problems of large but not strong, multiple and poor distinctions are obvious, the protection is not strict enough, infringement is prone to occur frequently, and the risks of overseas intellectual property rights of enterprises are getting higher and higher. Innovation and intellectual property are still important and hot issues in China's development.

All these intellectual property policies mentioned above are particularly important. The government plays an irreplaceable role in promoting technological innovation. The

government can support the technological innovation of enterprises through various macro IP policies (Xue, 2011).

1.2 Research Question

Just as mentioned before, firstly, the critical measure to avoid falling into “Middle Income Trap” is to move from imitation to innovation (Agénor, Canuto, &Jelenic, 2012). Secondly, IP policies have an irreplaceable influence on facilitating innovation (Xue, 2011). Therefore, adjusting macro IP policies to facilitate China move from imitation to innovation is feasible and reasonable.

As for Middle Income Trap, Japan is internationally recognized as one of the countries who escape from "Middle Income Trap" successfully. The most indispensable measure to escape from “Middle Income Trap” in Japan was also to successfully perform an economic development model transformation, especially move from imitating and importing foreign technologies to innovating technologies of their own.

As a developing market economy country, Japan has become one of the strongest countries in the world even from the ruins of World War II. It has been hailed as the economic miracle of the world. China is currently experiencing problems of economic transition and facing challenges of "Middle Income Trap", which the Japanese ever

experienced.

Moreover, Japan is a neighbour of China. Chinese and Japanese culture has a lot in common. The cultural exchanges have never stopped from the ancient time. So, in the context of similar East Asian culture, since China and Japan have faced the same historical situations, Japan's experience and practice have a significant reference to current China. Therefore, Japan's development experience in escaping from “Middle Income Trap” will set a good example to China.

The Japanese government attaches great importance to the protection of IP and clearly states the basic national policy of "establishing a nation based on intellectual property". After World War II, Japan took the strategy of building a nation based on technology as its national strategy for economic development and formulated a relatively established legal system for technological progress. Among them, the IP system plays a decisive role in Japan's technological innovation activities and has become one of Japan's most effective means of promoting technological innovation. Japan's intellectual property system has many lessons for China in terms of innovation, protection, application and management.

Therefore, my research question was: based on the references and lessons of Japan's practices, What China can learn from Japan so that China could promote

development of innovation, finally move technologies from imitation to innovation?

1.3 Research Objective

On the basis of Japanese experiences, it was not realistic to generalize experiences to China directly. From a practitioner in the field of IP, I have 11 years of working experience in IP and worked in IP examination and research departments successively. I am familiar and interested in IP macroeconomic policies, management measures and work practices in the field of IP. My research objective was: on the basis of my research, taking real situations of China into consideration and making some recommendations to Chinese IP policies.

1.4 Methodology

This report targeted IP policies for SMEs in both China and Japan as research object since SMEs are the main force of innovation and Japan is the country where SMEs make the most contribution to the national economy. In the first place, this report analyze existing challenges and difficulties had faced by SMEs in the application and management of IP. After that, this report found out that four categories of policies were provided to support SMEs by Japan Patent office (JPO) and State Intellectual Property Office (SIPO) in China. That were IP support policies for SMEs' R&D, patent

application, patent examination and oversea activities. And then this report compared the similarities and differences in the implementation of above four categories of policies between the two patent offices and summarized the pros and cons of the policies. At last, based on the result of comparison, this report would put forward some possible advices or solutions to conquer SMEs' IP challenges in China in order to facilitate innovation of SMEs finally.

1.5 Significance of the Study

This report conducted a comparative study of innovation-related policies in China and Japan, analysed and summarized policies of encouraging and promoting innovation in China and Japan from an IP practitioner's new prospective, aiming to put forward new ideas and proposals for facilitating innovation in China.

The findings of this report will provide an insight into the issue of furthering practices in IP polices. In addition, it's hoped that results of this report will redound to improvement of IP policies in China, in other words, provide Chinese IP policy makers with possible solutions or advices.

Chapter 2 Literature Review

2.1 The Evolution of Japanese Science and Technology Development Strategy

At different times, the Japanese government formulated different strategies for the development of science and technology depending on what was compatible with the level of economic and social development.

(1) Stage1--Imitation

Japan is an island nation with a small territory, inadequate resources, frequent natural disasters and high population density. In post-war era, Japan's economy was sluggish with poor material conditions. Compared with the countries in Europe and the United States, Japan's economy had a considerable gap in terms of its industrial structure, per capita gross national product, or technological level (Wang, 2008).

During the period from postwar to the 1950s, the country was destroyed due to the war, and at that time there was no capability to tackle the problems of the lack of domestic technical resources and the weak foundation of technology. Japan had to rely on foreign technologies to improve economic development and technological

innovation. Technological innovation in Japan started with the massive introduction of foreign technologies and equipment. The initial primary approach was basically to completely copy and imitate foreign technologies, and then to adapt the small and tiny improvement as needed during the application process. Through the introduction of large-scale technologies, Japan rapidly shortened the technological gap with Europe and the United States and saved a great deal of time and money. At the same time, Japan improved its technological capabilities in the process of imitation, study and improvement, laying a solid foundation for digestion, absorption and re-innovation (Xue, 2011).

(2) Stage II -- Digestion, Absorption and Re-innovation

From the latter half of the 1950s, the key point of Japan's technological innovation was located on the digestion, absorption and re-innovation of imported technologies. During this period, Enterprises not only just imitated or copied foreign technologies, but also absorbed and re-innovated them based on the implementation in Japan. In the light of the practical needs in Japan, enterprises created new products with Japanese characteristics and payed more attention to qualities of new products, which were inexpensive, durable and competitive in the international market (Liu, 2003).

(3) Stage III -- Home-grown Innovation

Since 1980s, with the increasingly fierce international competition, higher product costs caused by raw materials price rising, and environmental pollution caused by rapid economic development, the Japanese government realized that it was urgent to develop technology-intensive industries, upgrade industrial structure and greatly increase the added value of industrial products to win the competition in international markets. Coping with the changes in international and domestic situations, the Japanese government had to enhance basic research and develop its own independent technological development (Wang, 2008).

Under such circumstances, Japan issued a series of policies and strategies to facilitate innovation. In March 1980, the Japanese government implemented the strategy of *Building a Nation Based on Technology*. *The Basic Law on Science and Technology* promulgated by Japan in 1995 clearly proposed a national policy: *Establishing a Nation by Science and Technology Innovation*. In 2002, the Japanese government established a national development strategy of *Building a Nation Based on Intellectual Property*. It aimed to develop Japan into a technological power through a series of policy measures and institutional arrangements through direct government intervention and guidance.

These stages indicate a similarity between trajectory of Japan's technological development and that of China. So far, China has experienced stages I and II, and now is in the process of transforming itself into an independent innovation stage. Therefore, Japan's policies of promoting innovation can be of great reference to China.

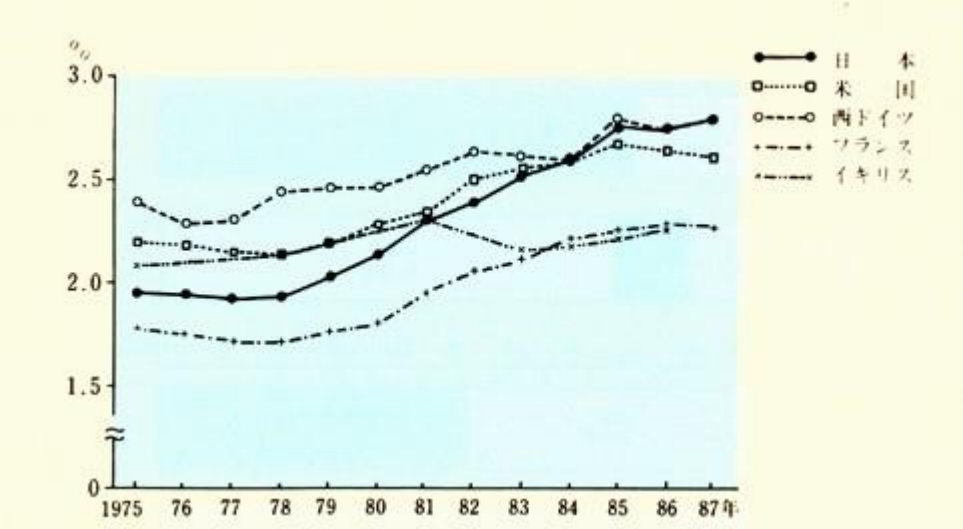
2.2 Japan's policies of promoting innovation

(1) Research & Development (R&D) Investment

R&D investment is a direct reflection of a country's science and technology level and the most important indicator of technological innovation ability (Lundvall, 1992). The Japanese government attached much significance to R&D investment, which had not only promoted the development of technology itself, especially its own science and technology, but also created technical premise for sustained economic growth (Li, 2009).

Japan's R&D investment accounted for more than 1% of GNP. Compared with many developed countries in the same period, the gap is relatively small. Japan's ratio of research expenses to GNP is 2.8%, which is already the world's highest level along with West Germany (Ministry of Education, Culture, Sports, Science and Technology of Japan, 1989) (See Figure 1).

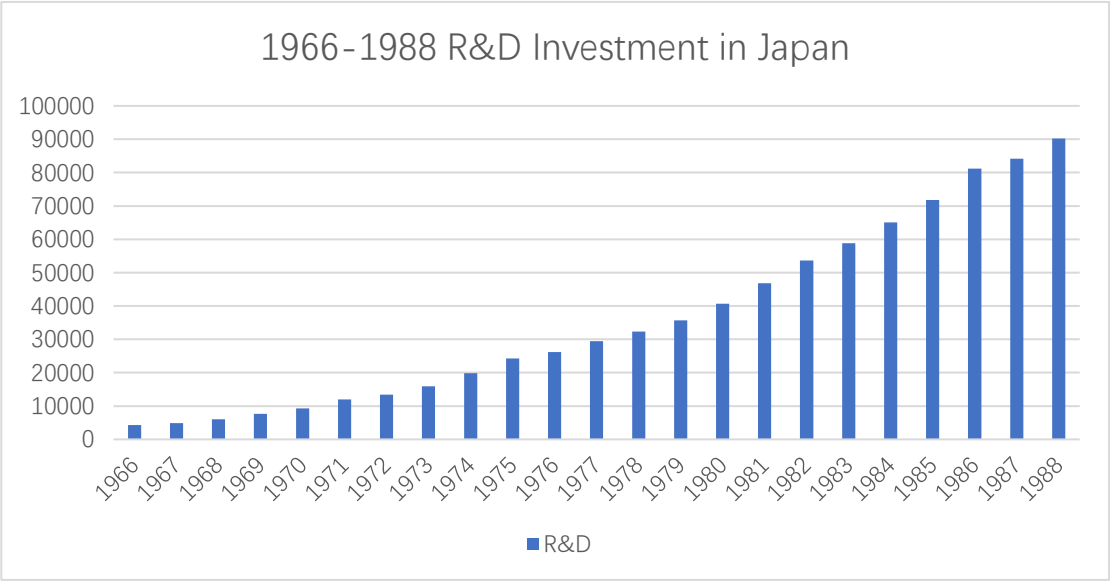
Figure 1 :Japan and other major developed countries R&D costs accounted for the proportion of GNI (1975-1987)



unit: %. Legend on the upper right corner of Figure 1 from top to bottom in turn represent Japan, the United States, Western Germany, France, England.

The R&D investment increased year by year dramatically from 1966 to 1988(Ministry of Education, Culture, Sports, Science and Technology of Japan, 1989) (See Figure 2).

Figure 2: R&D investment in Japan from 1966 to 1988.Uni: One hundred billion yen.



(2) Combination of Industry, Official and University

The formation of Combination of Industry, Official and University system started as early as the cooperation of industry and universities in the 1930s, when researchers from industry and universities cooperated on important issues in technology development and jointly published relevant research results (Zhang, 2007).

The forms of cooperation between industry and universities included the cooperative research by both parties, the university commissioned by enterprises, employed university researchers in enterprises, the hiring of faculty members as consultants, the training of enterprises' employees and the joint use of scientific intelligence documents.

After that, the government-owned research institutes have begun to carry out joint research with some enterprises or accept research commissioned by enterprises. The requirements of internal research of enterprises are directly reflected in the research content of research institutes.

This system which is dominated by private-owned enterprises and supplemented by universities and the government, has become one of the important features of post-war Japan's national innovation system.

(3) Tax System

The government has formulated a special tax concession system for enterprises' R&D. In addition, in order to encourage enterprises to purchase or update equipment for R&D, the government has set down a depreciation discount system specifically for R&D equipment. Moreover, the government has also developed a tax-free system for R&D equipment. For equipment used for major R&D technologies, 7% of its purchase price can directly offset the amount of income tax payable for that year (Yang, 2013).

(4) Small Business Innovation System

In today's world, Japan is the country where Small Medium Enterprises (SMEs) make the most contribution to the national economy (Rothwell & Zegveld, 1982). The successful development of SMEs cannot be achieved without the active policy support of the Japanese government. SMEs have also been an indispensable component of Japan's national innovation system and have played an important role in the early days of Japan's technological development. R&D activities for SMEs are not only a good complement to the research and development of large enterprises, but also more flexible. SMEs in Japan have been the Japanese government's concern and support. In 1998, the Japanese government established the "Small Business Innovation Research (SBIR)" in

accordance with the Law on Promoting New Business Creation (Yamaguchi, 2015). The main purpose of the system is to encourage the development of new technologies. The basic content of the system is: the type of R&D grants and commissions designated by the state for SMEs, and the annual target amount for grants and commissions to be provided to SMEs with technological development capabilities to promote small and medium-sized enterprises as soon as possible the new technology into commodities (Liu, 2004).

2.3 Summary

To sum up, Japan has taken many beneficial measures in its transition from imitation to independent innovation. The retrospective research on Japanese policies to promote innovation are mainly focused on the legislation, taxation, R&D investment and the combination of industry, official and university, and few of research is carried on Japan's IP policy, especially patent policies, including policy incentives for patent applications, patent examination, patent administration, patent protection, patent overseas layout and so on. Therefore, this report will concentrate on Japanese IP policies.

Chapter 3 Methodology

3.1 Research Purpose

As mentioned in the Chapter 1, IP policies could facilitate innovation. In other words, IP policies are associated or correlated with innovation as has been clarified by many other scholars in the past few years. This report didn't try to prove the regularities between them. Instead, this report is a descriptive study aiming to portray the characteristics of Japanese IP policies and Chinese IP policies as much as possible, especially the implementation situation and consequences of current policies. Then this report compared the Japanese IP policies and Chinese IP policies to figure out references and inspiration that China could learn from Japan.

3.2 Research Scope

IP policies involves many policies for large state-owned enterprises, SMEs, research institutes, universities and individuals. Comparing and analysing all above IP policies both in China and Japan is a tremendous task. Because of time limitation, this report narrowed its object down from comparing and analysing all the above IP policies to just comparing and analysing IP policies for SMEs in Japan and China. There were three reasons for the author to target IP policies for SMEs as research object.

First, SMEs are the main force of innovation. SMEs have a simple management structure, efficient management procedures and strong mobility. SMEs have a small scale of operation and a high degree of product specialization as well. All these make SMEs respond to markets and technologies in a timely and rapid manner. Many world well-known corporate giants, such as Microsoft, Google, and Apple, have rapidly grown from small businesses due to innovation. Therefore, it is indeed vital to study how to provide IP policy support for the innovation of SMEs.

Second, as mentioned in the Chapter 2 Literature Review, Japan is the country where SMEs make the most contribution to the national economy (Rothwell & Zegveld, 1982). Obviously, the successful development of SMEs cannot be achieved without the active IP policy support from the Japanese government. Studying Japan's IP experience in supporting the development of SMEs has important implications for China's current support for the development of SMEs.

Third, the Chinese government has always attached importance to the innovative development of SMEs. On October 8, 2014, the State Intellectual Property Office issued "Several Opinions on the Development of Intellectual Property Support for Small and Micro Enterprises." The "opinions" aims to support innovation and development of small and micro enterprises, improve the socialization of intellectual property rights for

small and micro enterprises, improve the ability of small and micro enterprises to use intellectual property, and optimize the environment for the development of intellectual property for small and micro enterprises. Studying IP policy support for SMEs is also a matter of urgency and adapts to the needs of the current era and society.

3.3 Research Framework

In order to study in detail how China can learn from the experience of Japan to promote innovation, I will conduct research in the following storyline.

To study and improve IP policies for SMEs, the first thing was to analyze existing challenges and difficulties had faced by SMEs in the application and management of IP. For example, what bottlenecks did SMEs face when applying for patents? What were the practical difficulties in patent infringement and litigation? Then how can these obstacles be overcome? About these challenges and difficulties, this report found out what policies were provided to support SMEs by JPO and SIPO and then compared the similarities and differences in the implementation of policies between the patent offices and summarized the pros and cons of the policies.

The research methodology is a combination of quantitative and qualitative analysis. Quantitative research is used to conduct the comparison by way of numerical data or

data that can be transformed into usable statistics. Some indicators would be chosen for contrast, for example, the number of patent applications in both Japan and China, the reduction proportion of patent fees in both Japan and China. Besides quantitative research, some parts of policies couldn't be compared through data, this report tried to describe the differences by explanation and then gain underlying reasons, opinions and motivations of the differences between the two countries.

At last, based on the result of comparison, this report would put forward some possible advices or solutions to conquer SMEs' IP challenges in China.

3.4 Source of Data and Validity

Data sources are mainly official policies, data and documents released by official websites such as World Intellectual Property Office (WIPO), JPO, SIPO, United States Patent and Trademark Office (USPTO), Ministry of Education, Culture, Sports, Science and Technology in Japan, Ministry of Science and Technology of China (listed in the References). Owing to my own working experience in intellectual property, I am familiar with and proficient in the above websites to ensure the availability and credibility of the data.

Chapter 4 Analysis

4.1 Definitions of SMEs

Before the analysis of IP policies support for SMEs in China and Japan, it is imperative to understand the definitions of SMEs in these two countries.

At present, the definitions of SMEs in various countries in the world are widely different. The aim of defining SMEs is mainly to grasp the scale structure of many SMEs and to understand the current situation and characteristics of SMEs. However, the ultimate goal is to provide a reliable basis for the country to formulate a correct enterprise support policy. The scientific definition of SMEs has a direct impact on the scope and object of the countries' support policy and is significant.

(1) Definitions of SMEs in Japan

After World War II, Japan's first version of definition of SMEs (See Table 1) (Japanese Government, 1963) originated from Basic Law for SMEs in 1963. The SME Basic Law was revised in 1999 and redefined SMEs. The scope of the revised SME was larger than before. The new definition of SMEs in Japan (See Table 2) (Japanese Government, 2017) was in fact defined by the double standard of the number of

employees and capital. Japan also took industry classification into consideration. From the Japanese government's adjustment of the definition of SMEs, the scope of Japanese SMEs was expanded. Its purpose was to allow more companies to enjoy preferential policies of the government.

Table 1: The definition of SMEs in Basic Law for SMEs in 1963

Industry Category	Scope of SMEs
Manufacturing	With a capital of less than 100 million yen, the number of employees is less than 300 under normal conditions.
Wholesale	The amount of capital is below 30 million yen. Normally, the number of employees is below 100.
Retailing	The amount of capital is below 1 million yen. Normally, the number of employees is below 50.
Services	The amount of capital is below 10 million yen. Normally, the number of employees is below 50.

Table 2:The definition of SMEs in Basic Law for SMEs in 2017

Industry Category	Scope of SMEs
Manufacturing, construction, transportation and other industries	A company with a capital of 300 million yen or less that employs frequently 300 or less employees and a personal business with 300 employees or less.
Wholesale	Companies with capital below 100 million yen and employees under 100.
Retailing	Companies with capital less than 50 million yen and less than 50 employees.
Services	Companies with a capital of 50 million or less and 100 employees or less.

(2) Definitions of SMEs in China

In 2003, the four departments of the State Economic and Trade Commission, the

National Development and Reform Planning Commission, the Ministry of Finance, and the National Bureau of Statistics jointly approved the “Interim Provisions for SME Standards” after the approval of the State Council, which stipulated the defining standards for SMEs in China at this stage (See Table 3) (The National Development and Reform Planning Commission etc., 2003).

Table 3: Interim Provisions for SME Standards

Industry Category	Number of Employees	Sales Volume	General Assets	Note
Industry	2000 or less	Less than 300 million yuan	Less than 400 million yuan	Medium-sized enterprises must meet more than 300 employees, sales of over 30 million yuan, and total assets of over 40 million yuan; the rest are small businesses.
Construction	3000 or less	Less than 300 million yuan	Less than 400 million yuan	Medium-sized enterprises must meet more than 600 employees, sales of over 30 million yuan, and total assets of over 40 million yuan; the rest are small businesses.
Retailing	500 or less	Less than 150 million yuan		Medium-sized enterprises must meet more than 100 employees, sales of over 10 million yuan; the rest are small businesses.
Wholesale	200 or less	Less than 300 million yuan		Medium-sized enterprises must meet more than 100 employees, sales of over 30 million yuan; the rest are small businesses.
Transportation	3000 or less	Less than 300 million yuan		Medium-sized enterprises must meet more than 500 employees, sales of over 30 million yuan; the rest are small businesses.
Post Mail Service	1000 or less	Less than 300 million yuan		Medium-sized enterprises must meet more than 400 employees, sales of over 30 million yuan; the rest are small businesses.
Accommodation and Catering	800 or less	Less than 150 million yuan		Medium-sized enterprises must meet more than 400 employees, sales of over 30 million yuan; the rest are small businesses.

(3) Comparative Study

China's current SMEs demarcation standards have similar characteristics to Japan: (a) they are all defined by the industry category as one of the defined standards (b) both Japan and China use the number of employees as a reference factor (c) both stipulate the multiple quantitative standards. In defining SMEs, Japan measures the size of SMEs in terms of “number of employees” and “amount of capital”, while in China, it is based on the number of employees, sales revenue, and total assets (Han, 2008). Three indicators are used to determine the division of SMEs. In contrast, the division of SMEs in China is more elaborate. The three parameter settings are more detailed than the two parameters in Japan. The number of SMEs in China are far more than the total number of SMEs in Japan in terms of absolute numbers (ibid). Setting more detailed parameter values can make the classification of SMEs more rigorous, which is conducive to Chinese government’s classification management and preferential treatment for SMEs’ support policies.

4.2 Existing Barriers of SMEs to Innovation in China

According to the above definition, the data from the National Bureau of Statistics of China (2017) shows that at the end of 2016, the number of SMEs are 377,000 which

had increased by 0.5 million from the end of 2015. Among them, 54,000 were medium-sized enterprises, accounting for 14.6% of the number of SMEs, and 316,000 small-scale enterprises, accounting for 85.4% of the number of SMEs(ibid). In 2016, the main business income of SMEs was 72.2 trillion-yuan, accounting for 62.7% of the main business income of industrial enterprises (ibid). SMEs are the largest group of enterprises in China and have an irreplaceable role in promoting economic growth, promoting innovation, increasing tax revenue, absorbing employment, and improving peoples' livelihoods. Since SMEs are regarded as guarantor of growth and employment, SMEs innovation activity is greatly related to a key source of competitiveness.

Acsand Audreteh, Aesetal and Karlssonetal in Han Nan's citation (2008) concluded that SMEs had a higher success rate in technological innovation compared with larger companies. This was because the flexible mechanism of SMEs was very conducive to technological improvement and the transformation of technological achievements into practical productivity. However, from the perspective of the development of SMEs in China, there are many constraints in the technological innovation of them.

(1) Lack of R&D Activities

In general, there is a positive correlation between R&D and firm productivity across all sectors. R&D innovation enables a small firm to leap into a new market, jump

to a new level of quality earlier than its competitors.

However, Chinese SMEs are lacking awareness of R&D and are inclined to import or imitate techniques. SMEs prefer to maintain their businesses instead of doing innovative activities which are considered as a time-consuming, costly and risky. As long as their products are still profitable, they are reluctant to undertake any risk or make any changes to their products (Xu, 2013). Even if SMEs have the consciousness of R&D, owing to the small scale and financing problems affecting SMEs, SMEs are unable to make sufficient investment in R&D, such as purchasing equipment for R&D, or doing experiments for new products and so on. Moreover, SMEs lack a high-quality, efficient R&D team (ibid). The initial products of SMEs are generally low-end products with low technical content. Because the products are simple and the technical requirements are not high, the quality requirements of the technicians are not high. Research shows that less than 10% of SMEs' employees have a college education (ibid). However, for SMEs to survive and develop, SMEs also need a core technical personnel. SMEs have a big gap in vocational perspective, monetary incentives, welfare coverage, working environment and research conditions, which make SME less attractive to excellent creative talents and result in brain drain.

There are some data about R&D expenditure in China. Data from Department of Social, Science and Technology and Cultural Statistics National Bureau of Statistics

and Department of Innovation & Development Ministry of Science and Technology (2016) show that Chinese companies' investment in R&D remains at a low level (See Table 4). In 2013, the proportion of R&D expenditure to GDP in China was 1.99, while in the same period, Japan was 3.48 and the United States was 2.74.

Table 4： R&D Expenditure and as a Percentage of GDP

Country	R&D / GDP						
	2008	2009	2010	2011	2012	2013	2014
China	1.44	1.66	1.71	1.78	1.91	1.99	2.02
USA	2.77	2.82	2.74	2.76	2.70	2.74	
Japan	3.47	3.36	3.25	3.38	3.34	3.48	3.59

Also, in *Global Innovation Index 2017* issued by World Intellectual Property Organization, China Mainland Innovation Index ranked No. 22 and scored 52.54. The top five countries or regions in the innovation index are Switzerland, Sweden, Netherlands, United States of America and United Kingdom (See Table 5)(World Intellectual Property Organization, 2017). As the only middle-income economy included in top 25 innovation group, China took up the 25th position in 2016 and keeps moving ahead (22nd position this year), but the distance between China and other countries or areas in top 25 group is still apparent. China shows that there are still gaps between the top 10 average scores and its scores in Institutions, Human capital and research and Creative Outputs (ibid). In conclusion, facts demonstrate that there are still some distances between China and top innovation countries and areas.

Table 5: Global Innovation Index rankings

Country or Area	Score	Rank

Switzerland	66.28	1
Sweden	63.57	2
United Kingdom	61.93	3
United States of America	61.40	4
Finland	59.90	5
Singapore	59.16	6
Ireland	59.03	7
Denmark	58.45	8
Netherlands	58.29	9
Germany	57.94	10

(2) Limited Access to Finance

Financing problems are the main obstacle to innovation for SMEs, especially the young and small enterprises (Zimmermann & Thomä, 2016). Difficulties SMEs have faced in accessing finance result in their insufficient investment in R&D. Data shows that approximately 70% of innovative activities is funded mainly by the owner and the partner's personal saving and loans from family or friends. Only 5% to 8% of SMEs acquires loans from banks (Bogers, 2011). Due to financing obstacles, R&D and intellectual property activities can't be carried out.

(3) Shorter Product Life Cycle but longer patent examination pendency

Nowadays, technology updates so rapidly that today's innovation is sometime

obsolete within one year or less. SMEs have faced a new challenge for an ever-shortening product lifecycle. The sustainability of SMEs and their products lifecycle have become imperative. Effective product lifecycle management represents a vital prerequisite for maximizing product lifecycle and achieving sustainability of SMEs.

As it is known, a patent is an exclusive right granted to an inventor for a fixed time period. Patented products usually cause an increase in sales or profits in a limited lifecycle. Product lifecycle management through patent provides SMEs a useful approach for extending product lifecycle and increasing market profits.

But in China, the number of patent application has increased notoriously quickly. In 2017, the number of Chinese invention patent applications reached 1.339 million, an increase of 21.5% year-on-year, ranking the first in the world for seven consecutive years (State of Intellectual Property Office, 2017). According to Clarivate Analytics (2017), China now accounts for over six of every 10 patented inventions worldwide. The net effect of increasing number of application is an increasing backlog in patent applications (National Research Council, 2003). The average pendency of substantive examination, i.e., the average number of months from an application is reviewed by SIPO to the date the application has reached final disposition (grant a patent or rejected), is 22 months in 2016 in China (State of Intellectual Property Office, 2017).

Obviously, there is a wide gap between the number of patent application filed with SIPO and the time available for examiner to review them. 22 months is so long as an entire product lifecycle. For SMEs, speed is an important leverage factor when extending product lifecycle. To some extent, the longer pendency of patent examination may not meet the needs of SMEs' product lifecycle management.

(4) Inadequate of Legal information and support

SMEs have limited legal awareness. When SMEs' product encounters IP disputes or infringements, SMEs don't know what to do and mostly no action has been taken. Some of such disputes or infringement have been resolved through informal legal channel at a cost of SMEs paying for a large amount of compensation.

Moreover, SMEs lack of access to effective legal services and support. Cost of legal services is regarded to be unbearable and unaffordable. SMEs seldom seek legal services or assistances from formal law office or patent agency. Even if SMEs have a legal consciousness of seeking assistance from professional lawyers when they face with some legal problems, legal assistance isn't provided timely and efficiently owing to inadequate money.

4.3 IP support policies for SMEs

4.3.1 Value Technology--IP Support Policies for SMEs' R&D

(1) What's Patent Information Analysis

In the past, patent information was used mainly for searching state-of-art when patent examiners reviewed patent applications or conducted an infringement search. For a long time, the value of patent information has not been recognized by most of people. But nowadays with the increasing progresses in the world's technology, patent information is widely used, the core of usage is patent information analysis. Patent information analysis is a unique and practical analysis method that has been commonly used by Patent Office all over the world to help their own countries' enterprises to get technological intelligence.

Patent information analysis refers to analyzing, processing, and combining a large amount of piecemeal patent information in patent specifications and documents, and using statistical methods and techniques to turn patent information into technological, competitive and legal intelligence with overall and predictive perspectives, which provides reference for decision-making in the development of technology, products and services.

Patent information analysis helps in getting an overview of existing technology because of disclosure requirements for patent documents. Patent information analysis provides information on the development degree of technology. The larger volume of patents has been issued, the more concentrated the technology development are. The fewer number of application has been filed, the more room is left for further research. These technological information benefit SMEs for selecting R&D themes and avoiding wasted investment in R&D.

In addition, Patent information analysis helps SMEs derive what their competitors are working on from patent activities of their competitors. Patent information analysis help SMEs gain an understanding of competitors' strengths, weaknesses and future strategies and avoid infringe competitors' patent. Conversely, it also helps SMEs to identify potential infringers.

In the past, patent information analysis was a very tedious and time-consuming job because patent experts need to screen useful information manually through a huge pile of patent files. But now mass data analysis tools make patent information analysis much easier.

(2) JPO's Patent Information Analysis Support

JPO realized that it was very important for SMEs to actively utilize patent

information for R&D. But the cost for patent information analysis is a big financial burden for SMEs. According to a questionnaire survey in *Heisei 20th Small and Medium Enterprise etc. Intellectual Property Support Policy Study Analysis Project (Basic Survey on Intellectual Property Activities of SMEs) Report (2014)*, as a public policy support necessary for tackling intellectual property activities, “Need for public policy support for patent information analysis such as prior art investigation” is 21.9% ranking No. 3, following No. 1 “Need for reducing domestic patent filing fees” 61.8% and No. 2 “Need for reducing overseas patent filing fees” 31%. In particular, the proportion of respondents who answered that small-scale businesses need support for cost reduction were high.

Therefore, JPO started to support comprehensive patent information analysis according to the needs of each stage of "R&D Stage", "Application Stage" and "Examination Request Stage" in intellectual property activities of SMEs to promote the effective utilization of patent information in 2015.

JPO carries out patent information analysis for SMEs when SMEs file applications for it. At the first stage of R&D, SMEs aims to enter new fields, develop new products or promote effective R&D. JPO focuses on supporting the formulation of R&D strategies. At the second stage of application, JPO helps SMEs to acquire wider protection scope and discuss whether the relevant technology can be turned into patent

right, which will provide insight into SMEs' decision-making about open a new field or end a field up. At the third stage of examination, in order to reduce expenses or fees by avoiding unnecessary request for examination, JPO help SMEs to investigate prior art and judge the possibility of obtaining patent right. During the R&D and application stage, JPO supplies the patent information analysis to SMEs for free, while for the examination stage, JPO charges a partial fee for patent information analysis. According to Patent Administrative Annual Report issued by JPO in 2017, JPO totally completed 81 cases and 130 cases patent information analysis for SMEs respectively in the first two stage and the third examination stage in 2016.

For example, in 2106, JPO analyzed patent information to help Ohara Co., Ltd set new business development prospect. Ohara Co., Ltd is a food company in Kanazawa City, Ishigawa Province. Ohara Co., Ltd planned to open a new field of improving the smell and elasticity of Konnyaku noodles, a kind of low-calorie food. At the onset of R&D stage, Ohara Co., Ltd hoped to investigate the patent possession situation, i.e. whether there are some existing patents about the production methods of Konnyaku noodles by other companies. The analysis from JPO showed that most of the previous research were about taste and diet, not too much about smell and elasticity of noodles. It proved the possibility of opening a new field of improving smell and elasticity of Konnyaku noodles by Ohara Co., Ltd. Also, there were some other successful cases of patent information analysis for SMEs in SMEs Patent Information Analysis Case Set,

such as, assisting the Hokkaido Research Institute of Sapporo in Hokkaido to analyze the usage and processing of multi-corn and assisting the HouYou Manufacturing Factory in Fukuoka Prefecture to analyze the R&D prospects of the intraoral cleaning device.

(3) SIPO's Patent Information Analysis Support.

The patent analysis and early warning project of the State Intellectual Property Office has been carried out for 10 consecutive years so far, and hundreds of research results have been accumulated which are listed in *2008-2017 State Intellectual Property Office Patent Analysis and Warning Project Catalog*. Referring to the Catalog, ten cases were done in 2016, such as, Patent analysis and early warning of key technologies for artificial intelligence chips, Research on Patent Trends of New Strategic Materials. They provide important decision-making reference for patent early warning and effective operation of funds in key national investment projects and key areas. The Intellectual Property Development Research Center of the State Intellectual Property Office serves as the office of the Leading Group for patent analysis and early warning of the State Intellectual Property Office. The patent analysis and early warning project of the State Intellectual Property Office is organized and implemented by the Intellectual Property Development Research Center of the State Intellectual Property Office. The center is responsible for the formation of professional teams composed of

patent analysis intelligence experts, patent examination business experts, industrial intelligence analysis experts, and patent agency senior experts to carry out project research work.

Besides that, the China Intellectual Property Society organizes "Patented Technical Analysis of Key Fields" and "Report on the Current Status and Development Trend of Patent Technology in Various Industries" every year. Until now hundreds of research results have been published, including 17 cases in 2016, for example, Patented Technology Status and Development Trend of Metamaterials, Patent Technology Status and Development Trends in Cloud Storage.

The subject of patent information analysis is selected by the Patent Office in conjunction with the relevant industry and technological development reality, focusing on the key areas and major projects of industrial development and technological innovation in the current and future years, with a focus on cutting-edge technologies, basic technologies, key technologies and major economic and technological projects, etc.

(4) Comparative Study

Patent information analysis is a useful method for SMEs' R&D strategies,

which is world widely promoted by Patent Offices. This method is conducted in different ways in China and Japan.

Firstly, in Japan, the initial of patent information analysis is a bottom-up approach, which means that it's decided or requested by SMEs whether to do an analysis about their own businesses. Once SMEs come up with their own problems and tasks, JPO get them working. This approach makes JPO's governmental activities customize practical and specific needs of SMEs. The Demand-Supply relationship between SMEs and JPO is bilateral collaboration. In addition, this approach is also budget saver because it is external-driven. If there is no real need or no request, no patent information analysis will be done. On the contrary, in China, the initial of patent information analysis is inclined to be a top-down approach, which means that SIPO mostly selects topics or themes of patent information analysis by itself without SMEs' requests. SIPO breaks topics or themes into smaller, work on it and then public results to the public. This approach is unilateral activity without collaborating with SMEs and considering the needs or implementational details of SMEs.

Secondly, the topics or themes of patent information analysis done by JPO were practical perspective concentrating on a tiny aspect or small branch of technology, which were tailored to the need of specific group SMEs. Oppositely, the topics or themes done by SIPO were macro perspective concentrating on basic research and cut-

edging research, which provided a big picture or overview of technologies. In addition, since the narrow scope of analysis, in 2016 the number of cases were done totally in Japan were 211, including 130 cases for free and 81 cases charged partially, while in China, 27 cases in all were done but all for free.

4.3.2 Value Money--IP Support Policies for SMEs' Patent Application

Any application for a patent filed with, and any other proceedings before, some fees should be paid, including filing fee and maintenance fee of an application, examination fee and reexamination fee; annual fee; fee for a change in the bibliographic data, fee for claiming priority, fee for patent registration and so on. All these fees can be a financial burden for SMEs who always have tight financial budget for R&D. Some Patent Offices offer reduction on fees to SMEs. For example, in USPTO, an applicant qualifying for a small entity or a micro-entity is entitled to receive 75% or 50% discount on fees. China and Japan also have reduction and exemption system of fees for SMEs.

(1) JPO's Reduction and Exemption System of Fees

Just like mentioned before in a questionnaire survey in *Heisei 20th Small and Medium Enterprise etc. Intellectual Property Support Policy Study Analysis Project (Basic Survey on Intellectual Property Activities of SMEs) Report (2014)*, 61.8% of

applicants expect JPO to reduce domestic patent filing fees.

SMEs certify that: have 20 or fewer employees (Commercial or service industry: 5 or less) or have been under 10 years from the start of business, or with capital not exceeding 300 million yen in less than 10 years after establishment will receive two-thirds reduction on examination fee, patent fee, sending Fee and preliminary examination fee.

Especially R&D-type SMEs certify that: its R&D expenditure ratio over 3% or its application related to projects based on the Act on Management Reinforcement of Small Business etc. will receive 50% reduction on examination fee, filing fee, sending Fee and preliminary examination fee (Detailed requirements for reduction in Japan refer to Table 6).

Each of the conditions need a certification document. There are some examples and fixed format for certification documents could be found on the main website of SIPO.

According to JPO statistics, 20,964 cases of R&D-type SMEs have been reduced on filing fees, 6,079 cases of R&D-type SMEs have been reduced on examination fees. 1,532 cases of SMEs have been reduced on filing fees, 4,276 cases

of SMEs have been reduced on examination fees.

(2) SIPO's Reduction or Postponement of the Payment of Patent Fees

In China, enterprises with taxable income less than 300,000 yuan in the previous year will receive an 85% discount on filing fee, substantive examination fee and annual fees. If two or more companies are joint patent applicants or joint patentees and each of them comply with the provisions of income, they will receive a 75% discount on filing fee, substantive examination fee and annual fees (Detailed requirements for reduction in China refer to Table 7).

The certified documents for reduction is copy of the annual corporate income tax return for the previous year.

Table 6:Reduction and exemption system of fees in Japan (before April 1st 2018)

Object		Expense	Proportion	Certified documents
SMEs	a. Small individual businesses have 20 or fewer employees (Commercial or service industry: 5 or less))	Examination Fee, Patent Fee, Sending Fee, Preliminary Examination fee	Fees are reduced by two-thirds. Patent fee is reduced from 1st to 10th year.	Certificate on requirements of small business
	b. Individual businesses who have been under 10 years from the start of business			Copy of business start notice (a document to be submitted to the director of the tax office that juristic the tax payment location when an individual starts a new business)
	c. Small enterprises (corporations) have 20 employees or less (Commercial or service industry: 5 or less))			Certificate on the requirements of small businesses, income tax return declaration or register of shareholders, roster of investors
	d. Corporations with capital not exceeding 300 million yen in less than 10 years after establishment			Certificate of registered matters of the articles of incorporation or corporation; Corporate tax return declaration or list of investors
R & D type SMEs	(1) SMEs requirements In the case of a company, it is necessary to fulfill the requirement of "number of employees" in the table below or "requirement of capital amount and total requirement of contribution" (in the case of individual business owner, only employee number requirement). Please note that conditions vary depending on industry. Employee number requirement: a. Manufacturing, construction, transportation and other industries (excluding b to e):300 or fewer b. For retailers: 50 or fewer c. In the case of wholesale or service business (excluding software industry, information processing service	Examination Fee, Patent Fee	Fees are reduced by 50%. Patent fee is reduced from 1st to 10th year.	(1) SMEs requirements Copies of employment insurance, labor insurance, payroll ledger etc., documents for confirming the main business (company brochure etc.); Certificate of registered matters of corporate entity (corporate registry certificate) etc. and documents to confirm the main business (company brochure etc.); (2) R & D requirements The total amount of the research and development expenses in the year prior to the year to which the application submission date belongs exceeds 3% of the total income on business income. If the examination research expenses ratio cannot be calculated after 27 months since the date of starting the project on the date of submission of the application, the number of full-time

	industry):100 or fewer d. In the case of the inn: 200 or fewer e. In the case of rubber products manufacturing industry (excluding automobile or aircraft tire and tube manufacturing industry and industrial belt manufacturing industry):900 or fewer Capital amount, total requirement of contribution: a. Manufacturing, construction, transportation and other industries (excluding b and c): Below 300 million yen b. In the case of retail or service business (excluding software industry and information processing service industry): 50 million yen or less c. For wholesale business: Below 100 million yen (2) R & D requirements R & D expenditure ratio over 3% or Application related to accredited projects based on the Act on Management Reinforcement of Small Business etc.			researchers is 2 or more, and the number of researchers is 2(It must be 1 / 10th of the total number of employees.); outputs based on the Act on Management Reinforcement of Small Business etc.
R & D type SMEs (Promotion Law for Asian Bases)	(1) SMEs requirements Same as above (2) Requirements for employee invention The invention applied is a job invention, and the employer (company etc.) has reserved and taken over the job invention. (3) R & D requirements Requirements for accredited research and development project planning.	Examination Fee, Patent Fee	Fees are reduced by 50%. Patent fee is reduced from 1st to 10th year.	(1) SMEs requirements Same as above (2) Requirements for employee invention Certificate of invention; Copies of contracts, work regulations and other provisions prescribed to inherit the right to obtain patents to users in advance with respect to employee inventions. (3) R & D requirements A document evidencing the (patent) invention relating to the

				results of research and development projects conducted in accordance with the Certified R & D project plan.

Table 7:Measures for the Reduction or Postponement of the Payment of Patent Fees in China

Object	Expense	Proportion	Certified documents
Enterprises with taxable income less than 300,000 yuan in the previous year (Where two or more companies are joint patent applicants or joint patentees, they shall comply with the provisions of the preceding paragraph respectively.)	Filing fee（exclude Publishing Printing Fees, Application Additional Fees）; Substantive Examination Fee for Invention Patent application; Annual Fees（Annual fee within 6 years from the date of grant of the patent）; Reexamination Fee	If the patent applicant or patentee is a company, the fee is reduced by 85%. (Where two or more individuals or companies are jointly patent applicants or joint patentees, the fee is reduced by 70%.)	Copy of the annual corporate income tax return for the previous year

(3) Comparative Study

The reduction of fees in China and Japan are aiming to alleviate financing burden for SMEs. But the implementation of reduction in both countries are different.

In Japan, JPO's reduction and exemption system are selective support. Not all SMEs have accesses to the reduction. The reduction and exemption system are inclined to support micro SMEs whose employees are below 20, young or newly set up SMEs whose establishments are within 10 years and especially R&D-type SMEs whose R&D expenditure ratios are over 3%. Although selective support, standards are multi-dimensions: scale, time, revenue or type. As long as meet one dimension, SMEs could be entitled to reduction. The certified documents for reduction is complex according to multi-dimensions but official support from main website of JPO to complete all these

documents could be gotten. In summary, this reduction and exemption system in Japan support a small number of SMEs but various type of SMEs.

In China, SIPO's reduction or postponement of the payment of patent fees are more universal support compared with JPO's way. The system is only one requirement for revenue. The enterprises, no matter big company or SMEs, whose taxable income in previous year are less than 300,000 yuan are entitled to receive an 85% discount on fees. The certified document is also simpler for enterprise to complete than that in JPO.

4.3.3 Value Time-- IP Support Policies for SMEs' Patent Examination

Expected pace of examination varies from different categories of enterprises. Not all applicants want to speed up examination for their applications. A few applicants, for example, drugs and medicine companies prefer deferred examination. The other mostly applicants call for fast examination because of rapidly progresses in technology and shortened life cycle. Some countries set up a dual track patent prosecution options: Fast Track or called Prioritized Examination and Slow Track or called Deferred Examination. Take USPTO as a case, on one hand, on request of an applicant, USPTO may grant a suspension of examination, which is called Deferred Examination. However, applicants in USA have reportedly used this procedure infrequently (Thomas, 2010). Exceptionally, drug and medicine companies have to get approval of the Food

and Drug Administration before selling products to the public. But they still need to apply for a patent application earlier for strategies and attracting venture capital. So Deferred Examination provides a good match for these medical manufacturers(ibid). On the other hand, USPTO also supplies applicants with Track One for prioritized examination, allowing inventors and businesses to speed up their patent processes within 12 months. Currently, it takes a very long time to get a patent in many countries to get a patent (Schutz & Madigan, 2016). With an increasing number of applications in patent offices all around the world, many of patent offices have made tremendous progress in shortening pendency but there is still a huge backlog of patent applications. Patent pendency problem is a common issue all over the world. Fast Track or Prioritized Examination give applicants a solution to patent pendency problem. If on request, applicants may put their applications in the fast lane. USPTO statistics (2013) show that over 48% of Track One for prioritized examination users are small entities, including micro entities.

(1) Early Examination System in JPO

On request of an applicant, the application can be processed preferentially by JPO. The pendency of Early Examination is shorter than usual. The eligibilities of applications should be as followed: applications are from SMEs or universities, applications have already been applied in other foreign countries, or applications related

to environmental issue, Asian Base Promotion Law (Since November 2012), and earthquake reconstruction and assistance (Since August 2011). SMEs' applications for Early Examination are subject to describing literature that applicants have already known, while other applications are subject to submit certain documents about prior art investigation.

The pendency from filing day to the first office action is average 2.5 months by using Early Examination System, which is much shorter than normal non-Early Examination applications. The number of applications for Early Examination in 2016 was 19,492 (See *Table 9*), an increase of 11.3% year-on-year.

Furthermore, a pilot project called Super Early Examination from 2008 accelerates examination for applications with higher importance, which are implementation related and foreign application related. The first office action will be conducted within one month from filing day of application. The number of applications for Super Early Examination in 2016 was 450 (See Table 10). The pendency from filing day to the first office action is average 0.7 month by using Super Early Examination System (Refer to Table 8 for detailed information about Early Examination and Super Early Examination System in JPO).

Table 8: Early Examination and Super Early Examination System in Japan and China

Requirements	Necessity of prior art investigation	Average Pendency
Single applications of SMEs or universities	Describing literature that applicants have already known is enough.	The average pendency from the day of application to the first office action is average 2.5 months by using the Early Examination in 2016.
Applications which have already been applied in foreign countries.	It is necessary, but it is available if there is a search result done by a foreign patent office.	The average pendency from the day of application to the first office action is average 0.7 months by using the Super Early Examination in 2016.
Applications which have already been implemented.	Necessary	
Applications which are related to environmental protection	Necessary	
Applications which are related to Asian Base Promotion Law (Since November 2012)	Necessary	
Applications which are related to earthquake reconstruction and assistance (Since August 2011)	Describing literature that applicants have already known is enough.	

Table 9: Trends in the number of applications for early examination

Trends in the number of applications for early examination						
Year	2011	2012	2013	2014	2015	2016
Number of Application	12170	14717	15187	17086	17511	19492

Table 10:Trends in the number of applications for super early examination

Trends in the number of applications for super early examination						
Year	2011	2012	2013	2014	2015	2016
Number of Application	361	471	485	642	554	450

(2) Prioritized Examination in SIPO

In China, Prioritized Examination is eligible for below situations: applications are related to key national development industries, industries that mainly encouraged by government, areas that update fast, implementation, prior right or great significance to national interests or public interests (Refer to Table 11 for detailed information about Prioritized Examination System in SIPO).

For Invention Patent, the first office action will be within 45 days and final disposition will be within one year; For Utility Model and Design, the final disposition will be within 2 months.

(3) Comparative Study

Patent pendency statistics are a visual pointer that how effective support is supplied to its own enterprises. If the country promotes or encourages its own

innovation, then the patent office should serve enterprises with speed and efficiency (Schutz & Madigan, 2016).

In Japan, JPO support SMEs with Early Examination System. As long as SMEs request for Early Examination, their patent applications will be in a fast lane. In addition, SMEs are allowed to just describe literature they have already known instead of submitting the prior art investigation which is more complicated and costly. SMEs have an access to fast track examination without additional fees. In China, there are not special procedures for SMEs to apply for Prioritized Examination unless subject matter of their applications is related to specific industries or particular conditions. Once SMEs are eligible for Prioritized Examination, they are subject to submit the prior art investigation. In conclusion, JPO value of SMEs' time very much and give timely support to SMEs and there is not exceptional support for SMEs for fast track in China.

The average pendency from filing day to first office action in SIPO is 45 days, between Early Examination's average 2.5months (75days) and Super Early Examination's average 0.7 month (21days).

Table 11: Prioritized Examination System in SIPO

Requirements	Necessity of prior art investigation	Average Pendency
(1) Key national development industries such as energy conservation and environmental protection, new generation of information technology, biology, high-end equipment manufacturing, new energy, new materials, new energy vehicles, and intelligent manufacturing; (2) Industries that are mainly encouraged by the people's governments at the provincial level and the district level; (3) Involving areas such as the Internet, big data, and cloud computing, and the update of technology or products is fast; (4) The applicant for the patent or the requester for reexamination has been ready for implementation or has begun to implement it, or has evidence that others are implementing its invention and creation; (5) The same topic of this application has been also submitted by applicant in another country or region. (6) Others that are of great significance to national interests or public interests need priority inspection.	Necessary	(1) For Invent Patent, the first office action will be within 45 days and final disposition will be within one year; (2) For Utility Model and Design, the final disposition will be within 2 months.

4.3.4 Value Oversea Market--IP Support Policies for SMEs' Oversea Activities

Along with the globalization of the economy, overseas expansion is advancing even in SMEs, but as for countermeasures against development of marketing routes and counterfeiting damage in overseas markets, patent rights are important. However, acquisition of patent rights overseas is costly and it is a heavy burden for SMEs with budget capital.

(1) JPO's Support Policies for SMEs' Oversea Activities

Firstly, JPO takes measures against oversea IP infringement. Along with the globalization of the economy and the economic development, counterfeit goods have been manufactured and damage has been reported all over the world. The flooding of counterfeit goods may have a negative influence on enterprises such as a decline in brand image. It is extremely important to take countermeasures. From 2014, JPO provided timely and appropriate information for SMEs abroad. Through JETRO, infringement surveys of counterfeit goods remanufacturers and distribution routes of counterfeit goods were grasped and warnings to counterfeit good companies based on the findings were carried out. And part of the cost is subsidized. In 2016, 20 cases were done.

In additional, fees of investigation are subsidized (Counterfeit countermeasure support project). Assistance rate is two-third of expenses. The maximum number of subsidies is 4 million yen, including infringement research expenses, warning text preparation fees to counterfeit goods companies etc. Moreover, when SMEs are accused of infringement by a foreign local company, expenses required for dispute will be subsidized (Defense type infringement countermeasure project), including consultation fee to patent attorneys/attorneys, litigation expenses, expenses required for settlement etc. The maximum number of subsidies for defense type is 5 million yen.

Secondly, JPO take measures against IP disputes overseas. With the increase in the number of overseas applications filed by local companies, the risk of SMEs getting involved in IP disputes overseas, including China, is on the rise. SMEs are unable to respond properly due to lack of funds. They are in a situation of worsening overseas business environment, such as withdrawal from business or a crisis of bankruptcy. Therefore, JPO, the Japanese Chamber of Commerce and Industry, the National Federation of Commerce and Industry, and the Federation of Small and Medium Enterprise Enterprises created the first oversea intellectual property litigation expense insurance system named “Measure as a Safe Net”. When SMEs are involved in IP disputes overseas, this insurance system provides insurance coverage of litigation expense for SMEs.

Thirdly, JPO provides foreign application assistance for SMEs. To promote strategic foreign patent applications of SMEs from 2008, JPO has subsidized part of the expenses required for foreign patent applications to SMEs who are planning to develop businesses in foreign countries.

Subsidy rate is within one-half. Maximum supplementary amount for one company is 3 million yen (in case of multiple projects). The upper limit for each case is 1.5 million yen for patents, 600,000 yen for Utility model and design. Subsided expenses include application fee, agency costs, translation costs, etc.

(2) SIPO’s Support Policies for SMEs’ Oversea Activities

In 2015, the State Council of the People's Republic of China issued Several Opinions of the State Council on Accelerating the Building of a Powerful Intellectual Property Power under the New Situation, which clearly stated that it is necessary to strengthen overseas deployment of intellectual property rights and risk prevention and control in key industries. For example, Chinese government will strengthen the planning for the overseas deployment of intellectual property in key industries, improve the overseas IP right risk warning system, improve overseas IP information service platforms, and enhance overseas IP right risk prevention and control capabilities.

However, SIPO haven't disclosed publicly any specific measures or support for enterprises' oversea activities, especially specific support for SMEs' oversea activities[1].

(3) Compar[2].ative Study

JPO provides a full support for SMEs' oversea activities, not only measures for IP oversea disputes and infringement, but also financial support. As it is known, measures and finance are two important factors in dealing with oversea activities. JPO backs up SMEs' oversea activities better than SIPO, who haven't issued any specific policies for SMEs' oversea activities[2].

[1] Based on the author's finding until May. 2018.

[2] Based on the author's finding until May. 2018.

Chapter 5 Conclusion

5.1 Recommendations

The comparative analysis in last chapter provided a clear picture of the two countries' IP policies. The IP policies of the two countries have their own pros and cons. The practices by JPO can clearly provide an insight into IP support policies of SMEs by SIPO. But some practices might not be applied mechanically in SIPO, after all every country has its own different situation. This report tried to make some recommendations to SIPO carefully and took different actual situation in China into consideration. Continuing to follow the storyline in Chapter 4, the recommendations were developed also in four aspects.

Firstly, when it came to IP support policies for SMEs' R&D, JPO's patent information analysis was a bottom-up style and inclined to give advice for SMEs in practical perspective. Oppositely, SIPO's patent information analysis was in macro perspective and top-down style, which provided a big picture or an overview of technologies. Definitely, it was good for national level government office to give an overall comprehensive overview of technologies. These macro perspectives benefited big entities who were doing basic research, for example, research centers, universities

and big companies. But it's better for SIPO to provide some practical technological support for both SMEs and big entities. For example, every year there will be some patent information analysis projects to which SMEs are entitled. These projects could be initiated or applied by SMEs. The topics or subject matter may be determined by SMEs. Since there are so large number of SMEs in China, it's not realistic for SIPO to do patent information analysis for SMEs as long as they apply for it. Maybe SIPO could come up with a method or threshold to screen and evaluate candidates, such as, screen R&D type SMEs out of candidates. The screening method will become a good guidance for SMEs and then lead them to pay more attention and invest more to R&D. As for fees or expenses, it's better to serve SMEs for free because SMEs usually call for reduction on fees. At last, workload should also be taken into consideration. SIPO could make a balance between its workload and number of patent information analysis projects for SMEs.

Secondly, IP support policies for SMEs' patent application from JPO were selective style, not all SMEs were covered. The policies preferred to support young, newly set up SMEs, R&D type SMEs and so on. In SIPO, a wider range of SMEs were supported. It was noted that Japan Ministry of Economy, Trade and Industry announced Amendments to Patent Law in February 27th 2018. The reduction and exemption system in Japan has been revised. The reduction and exemption have been applied to all SMEs without any threshold. The new Patent Law was enacted in April 1st 2018. In other word,

now JPO provides even wider monetary incentive to SMEs than SIPO. In recent years, the number of patent applications has been gradually decreased since 2007. This phenomenon is different from other patent offices who face an increasing application volume. This new monetary incentive may be a good way to incentive patent application of SMEs in Japan. For China's case, in 2016, the number of Chinese invention patent applications reached 1.339 million, an increase of 21.5% year-on-year, ranking the first in the world for seven consecutive years (State of Intellectual Property Office, 2017). According to Clarivate Analytics (2017), China now accounts for over six of every 10 patented inventions worldwide. It's urgent for China to swift from quantity increase to quality improvement. Therefore, it might be better for China to adopt Japanese previous practice: selective support, especially R&D type SMEs. This recommendation is aiming to improve quality of patent application. That is to say, SIPO would provide more accurate support to R&D type SMEs. This measure may cause decrease in number of application immediately but in a long run it will benefit the quality of patent application.

Thirdly, as for fast track or prioritize examination, JPO provides a full and timely support for SMEs. As long as SMEs file a request for Early Examination, their patent application will be processed faster than usual. But it's not realistic in China. There are a large number of SMEs in China. If SIPO adopts JPO's practice mechanically, it will be added a huge workload to SIPO, who are already tackling pendency and

backlog problems. If SIPO speeds up all SMEs' patent application, it will definitely slow down others' application. Just like Schutz and Madigan (2016) said in some cases prioritized examination or fast track "simply move the workload around by favoring some technologies and applicants over others". Then this is a "zero-sum game", with taking SMEs' applications ahead of time but slowing down others' applications. With taking SMEs volume and SIPO's workload into consideration, it's not suitable for SIPO to adopt JPO's current practices. In SIPO's current practice, if SMEs applications are related to prior right, foreign applications and implementation, they can also be processed faster than usual. This current practice makes a balance between support for SMEs and proper workload for SIPO.

Fourthly, JPO really did a better job in supporting SMEs' oversea activities compared with SIPO. Measures and finance support were two important pillars. The insurance system was also a good practice for SMEs to get enough fund. In China's case, with the impact of global economic integration, the foreign trade of Chinese SMEs has been flourishing. Data showed that SMEs account for about 60% of China total exports amount (Wang, 2005). Footwear, toys, lamps, small appliances, bags, plastic products and other large-scale labor-intensive products, mainly have relied on exports of SMEs. Therefore, SMEs have been active in foreign trade activities, which easily lead to intellectual property issues and disputes. It is urgent to provide support policies and assistances, increase SMEs' awareness of IP rights, enhance the ability of foreign

trade and cooperation, and enhance the abilities of competitiveness of enterprises in the international market. It's crucial for SIPO to lay down specific support policies for SMEs' oversea activities. JPO's practices set a good example for SIPO. SIPO can subside SMEs' oversea patent application and then raise the consciousness of global IP management and implementation. In additional, it is better to provide effective solutions and advice to SMEs when they encounter IP disputes overseas. For example, during overseas litigation process, SIPO can provide effective legal aid about Patent Law of foreign countries.

In conclusion, SIPO has to offer effective supports for SMEs from technology, money, time and oversea market perspectives, which are vital for SMEs' innovation and creation. Since there are a large number of SMEs in China, it's not realistic to cover all SMEs around the country. So, these supports prefer to selective supports, leading SMEs engage more in R&D activities and move from imitation to innovation.

5.2 Limitations

Although this report has reached its research objectives, there were still some unavoidable limitations and shortcomings. Firstly, because of time limitation, the research was conducted in a limited scope, which only studied in SMEs. Further research about policies for universities, research centers and big enterprises was

suggested. Second limitation were language obstacles. Some policies, data and literatures about Japan were in Japanese. The author of this report is limited to read and interpret Japanese language into English, since the author is also an ESL (English as a Second Language) student.

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Abbreviation and Acronyms

GDP	**Gross Domestic Product**
GNI	**Gross National Income**
IP	**Intellectual Property**
R&D	**Research & Development**
SBIR	**Small Business Innovation Research**
SMEs	**Small and Medium-sized Enterprises**
TLO	**Technology License Organization**
JPO	**Japan Patent Office**
SIPO	**State Intellectual Property Office of People's Republic of China**
USPTO	**United States Patent and Trademark Office**