Patent pool analysis based on technical standards: A case study of indigenous alliances in China

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ABSTRACT

China has set up only two sorts of patent pools (PLs) with technical standards, namely, the AVS alliance and IGRS alliance. Both PLs are applied in the IT industry. Statistics of patent alliances with global technical standards show that Chinese enterprises cannot easily form and develop an international PL. This study analyzes the formation process of the AVS and IGRS patent alliance, and points out the challenges in building and developing Chinese PL. The study offers suggestions on alliance management, government guidance, and international cooperation.

Key Words：Technical Standards, Patent Pool, AVS alliance, IGRS alliance

1. Introduction

The combination of technical standards and patent pool (PL) promoted the development and application of

technical standards, especially in high-tech fields. Monopoly in the core technology of high-tech products and technical standards of PL enabled European and U.S. enterprises to build technical and intellectual property barriers, which resulted in the struggling development of Chinese enterprises. The trends in global integration and the network impact of technical standards encouraged an increasing number of enterprises to recognize the superiority of building PLs with technical standards. Examples of PLs with international standards are IEEE 1394, WCDMA, ATSC, and DVB-T.

No uniform technology standard exists in China. However, related industries are aware of the positive role of technical standards as a fence to PL, such as AVS and IGRS. Most PLs are produced based on foreign technical standards. Therefore, Chinese enterprises often suffer from foreign technical and intellectual property barriers, which is a serious impediment in China's participation in the international market. The DVD and color TV industries are examples of industries whose developments were affected by patent barriers.

Empirical research that explores the PL is limited because most scholars concentrate more on court jurisprudence and economic analysis rather than on empirical studies. Moreover, PL information is scattered, which causes difficulty in obtaining statistical dates, thus increasing the difficulties in conducting empirical analysis. However, the research cycle of the previously mentioned analytical methods is relatively long. Although some scholars have investigated the formation mechanism from different perspectives, most of the recent economic analyses presume that any patented company will participate in a PL. This participation (or qualified invitation) is also presumed, which limits the results of the analysis. Existing literature mainly applies comparative statistical analysis and partial equilibrium analysis to build the basic model, which limits the depth of research. Therefore, the formation mechanism of PLs should be analyzed by building a more complete and dynamic model using empirical analysis.

2. Development of PL with technical standards

The development of PLs with technical standards is a new stage in corporate patent strategy. This development follows a trend in scientific and technological standards in the context of globalization. The re-emergence of the modern PL has its own profound background.

2.1 Definition of PL with technical standards

A technical standard is a guideline or a formal document for universal or reusable products or related production methods, which is approved but not enforced by accepted authorities. The economic benefits of technical standards in the context of economic globalization and technology (information technology and digital technology) significantly depend on technological innovation and intellectual property rights (IPRs). Technical standards involve technical elements and indicators, and their derivative—IPRs—which make technical standards the basis of independent innovations. Technical standards are gradually becoming the highest targets in patent technology. "Technology patents," "patent standardization" and "standard monopoly" are the new game rules in international market competition in the knowledge economy era. Technical standards at present have reached commanding

heights in the world industry competition, and the connection with patent technology is becoming more significant.

The IEEE technical standard is an example. Based on the related patent information with standards supplied by the IEEE patent database since the 1993, Table 1 shows the number of companies that possess essential patents with technical standards and the number of essential patents that have been established and protected by technical standards, which are all published by the IEEE. These statistics indicate that the development of IEEE technical standards in recent decades has been closely related with patented technology (Table 1).

Table 1. Patents with IEEE technical standards

Technical Standards	Number of companies that possess essential patents with technical standards	Number of essential patents established by technical standards	Technical Standards	Number of companies that possess essential patents with technical standards	Number of essential patents established by technical standards
IEEE 31–754	8	3	IEEE 802.17–802.22.1	31	110
IEEE 802–802.1	25	45	IEEE 1003.1–1101.1	5	4
IEEE 802.3	59	75	IEEE 1149.1–1149.7	10	21
IEEE 802.5–802.10	18	17	1212.1–1355.1	7	18
IEEE 802.11	85	473	IEEE 1363–1364	16	75
IEEE 802.12–802.15	44	49	IEEE 1390-11073-20601	64	121
IEEE 802.16	49	492	IEEE C37.60–C57.127	2	1

Note: These dates were obtained by statistical analysis of the patent from the official data of the Patent Standardization Committee of the IEEE standards (IEEE-SA). (Published: 1993 to 2010).
http://standards.ieee.org/db/patents.

Patent standardization enables patent technology to evolve into technical standards or to be included in the technical standards to promote patent technology. Similar to the formation of technical standards, standardized patent technology can be formed in two ways. First, according to the patent policy made by standard-setting organizations, the patent technology of enterprises that disclose their own essential patents can be recognized by

the government and its authorized organization or the International Standardization Organization. This patent technology can be laid down in the official and statutory standards, such as the DVB-T, ATSC, MPEG, the IEEE 802.11, and other technology patents. Second, leading enterprises in technology or enterprise groups develop their core patent technology into de facto standard through the developing markets or by enriching their products and enlarging the market capacity of related technology to further occupy major markets. The NFC, the TV-Anytime, DVDs, and other technology patents are representatives of this patent formation.

2.2 Competitive advantage of a PL with technology standards

The close combination of patents with technical standards and the inherent territoriality and exclusiveness in the patent itself facilitate the entry of patents into broad and universal standard ranks. Standards development and promotion may form a monopoly because of the popularity of patent standards. In terms of market access, standards development and promotion will exclude products that do not meet with the standards, and will eventually exclude competitors. Therefore, the contention of technical standards has evolved into a new form of market competition in the knowledge economy era, in addition to being a competitive weapon for developed countries in guarding their markets, conquering other markets, and gaining the greatest economic benefits.

2.2.1 Multinational corporations with patent standards reap excess profits

Patent technology upgrades national or international technical standards through specific procedures, or upgrades the technical standards accepted by the market by establishing a competitive position. Enterprises with technical standards rely on network effects to promote and use patent technology more widely to obtain profits from the huge market share of the patent product. These enterprises also obtain excess economic profits through IP licensing. For example, by virtue of its CDMA mobile communication international standard, Qualcomm now has more than 3,900 CDMA and related technology patent and patent applications. As CDMA technology swept the world quickly and has accounted for 20% of the wireless market, Qualcomm has granted CDMA patent licenses to more than 130 telecommunications equipment manufacturers in the world.

2.2.2 Patent standards affect the development of the industry

As a key point in industry competition, technical standards affect the development of latest technology and the dynamic trend of the industry. For example, in May 2000, the International Telecommunication Union (ITU) determined WCDMA, CAMA, 2000, TD-SCDMA, and WiMAX as four major wireless interface standards. This provision was written in the 3G technical guidance documents, “The International Mobile Communications Project (2000),” which marks the favorable position of technical standards competition in the 3G era. This development also determines billions of dollars of capital flows in the field of mobile communications, and attracts several well-known domestic and international communications companies to participate in R&D and licensing.

Technical standards can also weaken the market competitiveness of opponent industries and combat patent strategy competitors. Using their technical standards, the United States, Canada, France, Japan, Korea, and other countries launched a series of patent attacks against China involving color TV, battery, DVD, GSM mobile phone, toys, turbine blades, digital cameras, and CDs, among others. Thousands of Chinese enterprises were affected,

particularly the DVD and color TV industries.

2.2.3 Technical barriers of patent standards

Technical barriers can easily become nominally reasonable and formally legalistic because of technical standards and technical regulations. Technical standards and IP barriers have played an important part in protecting and occupying the market, whereas technical standards have gradually become the main form of non-tariff barriers. Standard internationalization has become a global trend in trade globalization and in the growing demand for international standards. Western countries such as Britain, France, Germany, and the United States will implement international and regional standardization to control the international standardization of technology. These countries will continue to upgrade their own standards to international legal standards based on their absolute technological advantage. The EU and its member states are more active implementers. They set technical barriers to prevent the products of other countries from entering the EU market or any market of a member state market. The main industries affected by this competition are automotive, electrical, mechanical, and pharmaceutical industries, especially household appliances.

2.3 Strategic advantage of a PL with network technical standards

A PL is a formal or informal organization that unites the patents of different patent holders and grants a unified patent license. PLs can eliminate barriers, reduce litigation costs and marginal spillover effects, and distribute exploitation risks among members. In this sense, it also can be considered as an effective way of avoiding "anti-commons tragedy." A PL is an important tool for enterprises in promoting technical standards and obtaining economic benefits. Thus, it can fundamentally affect standards promotion and market penetration by expanding the installed base of users. As a result, consumer expectations are affected, the positive feedback mechanism of technical standards is enhanced, and the market access barriers are improved. Therefore, a strong "lock effect" will enable technical standards to counteract the creation advantages of new competitors and to form a huge barrier to new technology products for entering the market. Owing to the monopoly rights of a standard patent, members of a PL can refuse a technology license or charge exorbitant license fees to weaken the competitiveness of new entrants, which also increases entry barriers.

The DVD technology is an example. China has become the world's largest DVD production base, which accounts for 20% to 25% of the world market share. However, the DVD production in China is limited to DVD 3C and DVD 6C PL. Since April 2002, DVD enterprises in China have been required to pay royalties for DVD production, amounting to $13.8 to the DVD 6C Union, $5 to the DVD 4C Union, and $1 to $1.5 to Thomson. Washer enterprises in China pay a total of $22.3 to $22.5 for DVD production royalties. DVD 6C PL dominates the market through patent standardization, and obtains a huge market interest through royalties, thus increasing market barriers and monopolizing the market.

3. Formation mechanism of Chinese PL with technical standards

Two kinds of PLs with technical standards exist in China, namely, the AVS Patent Pool and the IGRS Patent Pool, which are mainly in the information industry.

3.1 Formation of the AVS Patent Pool

The Audio and Video Coding Standard Workgroup of China, commonly called the AVS Working Group, was approved by the Science and Technology Division of the Chinese Ministry of Information Industry in 2002. The "IT advanced audio and video encoding" standard (AVS standard for short) created by the AVS Working Group, is the common basic standard for the digital audio and video industry. AVS standard covers the four main technology standards of systems, video, audio, digital rights management, and support standards of conformance testing. As the second generation source coding standard that China initially created, AVS standard has reached international advanced level.

On December 18–19, 2003 at the 7th meeting of AVS, the AVS Working Group completed the first part of the AVS standard (system), the draft of Part II (video), and the final draft (FCD). The validation of software for approval was also completed. On December 29, 2004, the National Information Technology Standardization Technical Committee reviewed and adopted the draft of the AVS standard video. In January 2005, the AVS Working Group submitted the draft to the Ministry of Information Industry. On March 30, 2005, the draft obtained the initial approval of the Ministry of Information Industry; the video portion of the standard draft went into the stage of public notice. In the first quarter of 2004 (at the 8th plenary meeting), the "digital rights management and protection" standards officially began their development and are now nearing completion. Part III (audio) of the draft was completed in early 2005 (at the 12th plenary meeting). On February 22, 2006, the Standardization Administration of China issued a notice: "The second part (video) of the 'IT advanced audio and video encoding' will take effect on March 1, 2006." Hence, AVS Video became the official Chinese standard.

The process of setting the AVS standard is completely open to domestic and foreign enterprises to create maximum opportunities for the development of the industry at home and abroad. The AVS Industry Alliance, which includes TCL, Skyworth, Huawei, Hisense, Haier, Wave, Changhong, Shanghai Radio and Television, ZTE, and other famous domestic enterprises, was officially established in Beijing in May 2005. As a basic standard in digital audio and video industry, AVS provided a good opportunity for China to build an industrial chain of "technology → patents → Standard → chip and software → manufacturing → digital media operations and culture" industry (Figure 3). In 2008, to promote the development of the AVS Standard Industry, the Ministry of Information Industry gave great support to the AVS Patent Pool Administration Center, a management center hosted by the Institution of Electronic Science and Technology Information and the Institution of Computing Technology Chinese Academy of Sciences.

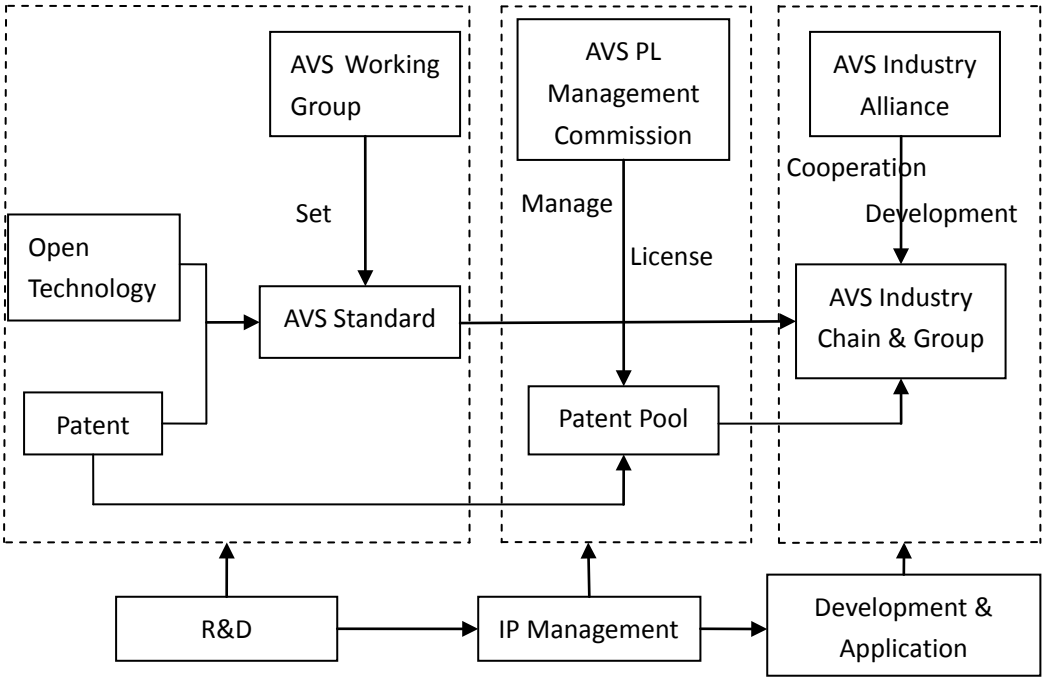

Figure 3. AVS Patent Pool in the AVS standard

The AVS Patent Pool Management Institution, which is registered as a non-profit organization in China, is devoted to organizing essential patents with AVS standard into the AVS Patent Pool and granting “one-stop” licenses. The AVS Patent Pool Management Committee is the decision maker, whereas the AVS Patent Pool Administration Center is the specific executing agency. The AVS Patent Pool Management Committee consists of 19 directors, including five technical and managerial experts invited by the relevant ministries of China (who are involved with the Ministry of Information Industry of China, Ministry of Science and Technology of China, China State Administration of Radio, Film, and Television, Development and Reform Commission of China, Standardization Administration of China, Intellectual Property Office of China, the Ministry of Commerce of China, and so on); six corporate users of the AVS standard; six licensers; the head of the AVS Working Group, who implements AVS intellectual property policies (non-voting); and the director of the AVS Patent Pool Management Center, an executive (non-voting).

The AVS Patent Pool Administration Center is a non-profit organization registered in the civil affairs department, jointly initiated by the Institution of Electronic Science and Technology Information and the Institution of Computing Technology Chinese Academy of Sciences. The AVS Working Group neither requires the applicant to prove the independence and objectivity of the proposed technology, nor requires the applicant to bear the corresponding legal liability for this technical infringement. Individuals or companies applying for a license through the AVS Patent Pool must ensure their independence, objectivity, and openness. If patentees reach a consensus on joint license agreements, licensing the patent will be easy. According to AVS provisions, the formation period of a PL must be controlled in three months or less. The AVS Patent Pool is only responsible for

licensing the patents with the AVS standard. Patent holders and users decide the licensing of patents without AVS standard by negotiation. The AVS Patent Pool is not involved in the authorization of patents without the AVS standard. In August 2005, the AVS Patent Pool Management Committee examined and accepted rules and working plans related to the management requirements of the AVS Patent Pool. The committee decided to take the "One Yuan Policy" as the basis for AVS patent licensing, and instructed the management center to draft the AVS Patent License Agreement.

3.2 The IGRS Alliance

The Intelligent Grouping and Resource Sharing Working Group, also known as the IGRS Alliance, was established on July 10, 2003 by five of the largest leading IT and consumer electronics companies in China, namely, Lenovo, TCL, Konka, Hisense, and Great Wall. On June 29, 2005, the IGRS Standard was formally approved by the Ministry of Information Industry as a Chinese National Industry, which became the first "3C devices industry technical standards" in China. On September 2006, the IGRS standard proposal entered into the approval stage of ISO Committee Draft ISO/IEC/SC25/WG1. Currently, the IGRS Alliance has 113 members worldwide, including academic institutions, network operators, software providers, middleware providers, chip providers, terminal manufacturers, and content suppliers, among others, almost covering all giants of the industry at home and abroad. The IGRS Alliance has 204 invention patents and has members that account for 50% of China's PC market, 40% of the mobile phone market, and 80% of the television market, forming a very healthy industry chain.

(1) Bottleneck of IGRS Alliance

The sound mechanism of Intellectual Property and Innovation highlights the advantage of the IGRS standard, and facilitates the application of the IGRS standard. To get more innovations with the IGRS standard and avoid intellectual property infringement, the IGRS Working Group develops a system of the IGRS Alliance with a simple, competitive, and "one-stop" patent licensing mode to reduce risk and negotiation costs for manufacturers with the IGRS standard. At present, the number of open IGRS patents has reached 204; all are independent intellectual property rights for the Chinese home enterprises. As the technical standard of Chinese independent innovation, the IGRS standard has the ability to compete with foreign advanced standards for patent cross-licenses. However, the IGRS Patent Union has encountered a number of bottlenecks.

(2) Joint patent licensing

Part IV (Intellectual Property Policy) of the regulations of the Working Group discussed the ownership issue of design patents. Within or after the standard-setting process, the members of the Working Group are obliged to disclose patents and patent applications they have applied for and authorized on a global scale. The members agree to gather essential patents or patent applications accepted by the Working Group into the IGRS Alliance, which is then managed by the Working Group. However, working out a simple rule on the issue of income distribution is difficult because the number and quality of the patents, as well as the contribution of the members, are factors to consider. At the same time, assessing the contribution of design patents with technical standard to the IGRS standard is also difficult. As corporations with the IGRS patents have complex backgrounds and various demands, the formation of a joint force is not simple. Balancing the interests of the vertical manufacturers and scientific research institutions is the primary problem to resolve.

(3) Operation of the IGRS Alliance

The standard is an updating and developing system. Patent has reached the height and width of its protection; thus, the operation of the patent alliance must be dynamic. With the continuous extension of the standard system, making a plan of patent alliance to promote the long-term tracking and maintenance of essential patents is necessary. The technical standard requires a great deal of resources and support. On the other hand, the application, search for, and registration of patents also require much money. In our country, nearly ¥20 million is needed to complete these tasks, whereas in the United States or in Europe, at least $200,000 is needed to apply for an international patent in the IT field. With regard to huge investments and long-term operations, the IGRS lacks enormous capital and has no rich experience in patent strategy and patent application. Therefore, maintaining and operating the IGRS alliance is a greater problem after its establishment.

4. Issue of developing Chinese PL with technical standards

4.1 Lack of competitive strength of Chinese enterprises

At present, Chinese industry technology standards lag behind the average level of international standards. In China, the existing industry standards are obsolete, develop slowly, and have weak supervision. Thus, Chinese enterprises have few opportunities to participate in the formulation of many international standards, whereas multinational companies are absolutely free to enter the Chinese market, which is not possible for Chinese enterprises.

Table 4. Statistics on patent pool with technical standards (1993–2009)

Patent pool	Set-up time (year)	Most close classification code of subordinate industry	Number of existing members	Nature of the technical standards	Member-countries of the alliance	Administration
GSM	1993	3669	5	Statutory standards	Germany, U.S., Sweden, Finland	Motorola
MPEG-2	1997	3652	26	Statutory standards	Korea, U.S., Netherlands	MPEG-LA
Bluetooth	1997	3663	8	De facto standards	Finland, Korea, Sweden, U.S.	Bluetooth SIG
WSS	1997	3663	2	Statutory standards	Germany	SISVEL
TOP teletext	1997	3652	2	De facto standards	Germany	SISVEL

DVD-3C	1998	3652	9	De facto standards	Korea, Netherlands	Philips
G.729	1998	3652	4	De facto standards	France, Korea, Canada	Sipro Lab Telecom
MPEG-2 AAC	1998	3663	12	Statutory standards	U.S., France, Germany, Netherlands, Korea, Sweden	Via Licensing
MPEG-2 System	1998	3663	10	Statutory standards	U.S., Korea, France, Netherlands	MPEG-LA
IEEE 1394	1999	3577	10	Statutory standards	Korea, Netherlands, U.S., Sweden	MPEG-LA
3G/ WCDMA	1999	3663	19	Statutory standards	Finland, France, Germany, Italy, Korea, Netherlands	3G Patents Limited
DVD-6C	1999	3652	9	De facto standards	Korea, U.S.	Toshiba Corporation
MPEG-4 Visual	2002	3663	29	Statutory standards	Netherlands, Korea, France, U.S., Netherlands, Germany	MPEG-LA
MPEG-4 System	2002	3663	8	Statutory standards	U.S., Korea, Netherlands, France	MPEG-LA
Advanced Audio Coding	2003	3652	14	Statutory standards	Korea, U.S., Sweden, Netherlands, France, Germany, Finland	Via Licensing

AVC/H.264	2004	3652	26	Statutory standards	U.S., Korea, France, Germany, Netherlands, Sweden, Canada	MPEG-LA
TV-Anytime	2005	3663	8	Statutory standards	Korea, France, Netherlands	Via Licensing
IEEE 802.11	2005	3576	6	Statutory standards	Korea, France, Netherlands	Via Licensing
Digital Radio Mondiale	2005	3663	14	De facto standards	U.S., Sweden, France, Germany, Korea, Netherlands, Canada	Via Licensing
VC-1	2006	3652	18	Statutory standards	Korea, U.S., France, Netherlands, Germany, Norse land	MPEG-LA
UHF-RFID	2005	3663	6	Statutory standards	Korea, Germany, U.S.	SISVEL
AGORA-C	2008	3600	4	Statutory standards	Germany, Korea, Netherlands	Via Licensing
MPEG Audio	2006	3652	6	Statutory standards	France, U.S., Germany, Netherlands	SISVEL
tru2way/OCAP	2006	3663	7	De facto standards	U.S., Netherlands, Korea, Japan	Via Licensing
NFC	2007	3663	4	Statutory standards	France, Germany, Netherlands	Via Licensing
DVB-MHP	2007	3663	7	Statutory standards	U.S., Netherlands, Korea	Via Licensing

ATSC	2007	3663	8	Statutory standards	U.S., Korea, Netherlands	MPEG-LA
DVB-T	2008	3663	4	Statutory standards	France, Korea	SISVEL
MPEG-4 SLS	2009	3652	6	Statutory standards	Singapore, Germany, Korea	Via Licensing
WiMAX	2009	3663	8	Statutory standards	U.S., Korea, China	Via Licensing
CDMA 2000	2009	3663	6	Statutory standards	France, Korea, Netherlands	SISVEL

Note: The technical standards industrial classification code is marked according to the United States (US) Standards Industrial Classification (SIC) code list. According to the mainstream standards of academia classification, technical standards are divided into two: de facto standard and statutory standard.

Based on the statistics of countries of PLs, foreign alliance members with great impact mainly come from developed countries, such as the United States, Germany, South Korea, Japan, the United Kingdom, Sweden, Finland, the Netherlands, France, Canada, and Singapore. Twenty-two alliance members are from Japan, 20 alliance from the Netherlands, 19 from the United States, 17 from South Korea, 16 from France, 6 from Sweden, 4 from Finland, 3 from United Kingdom, 3 from Canada, and 1 each from Norway, Switzerland, Singapore, Italy, and China. In these major international PLs, only Huawei of China joined the WiMax Alliance in 2009. In addition, there are three or more members from China in more than 80% of international PLs; eight members of the Advanced Audio Coding Patent Alliance and AVC/H.264 PL are from China. Good patent technology with IT technical standards is completely monopolized by the United States, Japan, and other developed countries. They exchanged and cooperated closely to take a dominant position of the IT patent standards.

In other words, Chinese enterprises lack the initiative and competitive strength to participate in the international competition. In terms of developing patent standards, although some related industries are aware of the positive role of the technical standards as a fence of PLs, such as the AVS and IGRS alliances, many industries still lack uniform technical standards. Their complete productions mostly apply with foreign technical standards. Thus, technical barriers and intellectual property barriers are erected by foreign enterprises. Chinese enterprises are free to participate in the international competition. Consequently, China must develop more patent standards as soon as possible and set up more PLs aside from the AVS Patent Pool and the IGRS Alliance.

4.2 Lack of sound legal system of a PL

Foreign governments developed PLs in a healthy way through the improvement of the antitrust regulation. Since the 1990s, the U.S. departments have promulgated a series of legal documents, such as “Antitrust Guide for International Business Activities,” “Antitrust Guidelines for the Licensing of Intellectual Property,” “Antitrust Guidelines for Collaborations among Competitors,” as well as “To Promote Innovation—The Proper Balance of Competition and Patent Law and Policy (2002).” The U.S. law not only affirms the positive role of PLs to promote

competition and further promote the rapid development of the U.S. Patent Alliance, but also guards against trade barriers and monopoly mechanism of foreign PLs. In addition, the U.S. DOJ develops a healthy way of PLs through Business Review. The formation plan of MPEG-2 Alliance submitted to the U.S. DOJ was approved in 1997. Since then, numerous companies have taken the MPEG-2 Alliance as a sample to prevent against antitrust, such as DVD 3C, DVD 6C and 3G Alliance.

In terms of these "comment letters" of the U.S. DOJ, antitrust review of the modern patent alliance is mainly focused on two aspects: (1) Patents of PLs are only complementary; (2) The proceeds of the relevant market competition are greater than the damage of the competition. To ensure the patents of PLs are complementary, PLs usually determine essential patents with technical standards using an independent expert assessment. Thus, the establishment and administration of essential patents by independent assessment is necessary in building the Patent Alliance.

Aside from the United States being the origin of the PL, the EU does not have a clear legislation regarding PLs, but rather brings PLs into the legal framework of patent licensing agreements or technology transfer contract in most cases. Most regulations of the patent license agreement or technical transfer contracts are mainly placed in competition law (including antitrust law and unfair competition law). Nevertheless, no essential difference in regulations exists between Patent Pool License Agreement and Patent License Agreement, aside from the aspect of dominant market position. Therefore, the EU legislation on technology transfer agreements contains the regulations of Patent Pool License Agreement. The EU approves the license agreement by administrative examination. Enterprises are required to submit the monopolistic behavior to the government, or they will face illegal consequences. The administrative legislation of EU has an outstanding performance, especially in its exemption regulation, wherein the European Commission (EC) is authorized to revoke an exemption.

The Japan Intellectual Property Strategy Headquarters announced the "Strategic Program for Creation, Protection, and Exploitation of Intellectual Property" on July 8, 2003. The program was designed "to support the patent pool contribution to the formation of technical standards, and to review the 'Guidelines for Patent and Know-How Licensing Agreements under the Anti-monopoly Act' (Fair Trade Commission, 1999)."

The Chinese government realized the importance of the standardization strategy in enhancing the competitiveness of the country; however, some drawbacks in the Chinese legal system still exist. One example is Article 15 of the Chinese Anti-monopoly Law, stating that, "Any agreements among undertakings in accordance with the exercise of intellectual property rights are not applicable for antitrust laws, but agreements among operators abuse of its intellectual property rights, restrict competition, and are applicable for antitrust laws." The above article has no clear definition of "abuse" and how to exercise IPRs. Given the existence of some related laws and delayed regulations, Article 15 cannot be practiced efficiently. There are also some regulations that act as a legal basis for PL anti-monopoly in China, such as Articles 329 and 334 of the "Contract Law," Article 13 of the "Interpretation of the Supreme People's Court concerning Some Issues on Application of Law for the Trial of Cases on Disputes over Technology Contracts," Article 29 of the "Regulations on Technology Import and Export

Administration of the People's Republic of China," and the relevant provisions of the Patent Law. However, these provisions are fragmented, and the scope of their application is extremely limited. In contrast, with the development of foreign PLs, China is at a disadvantage in the international competition with technology and market. Therefore, supplying the detailed antitrust regulation of PLs, laying down a reasonable strategy of PLs, and promoting technical standards for implementation of the strategy will have an important practical significance for China.

4.3 Lack of favorable environment to develop a PL

(1) Lack of a well-organized market with standardization

Chinese technical standards were drawn up by the government and managed in accordance with the administrative system. However, the administrative technical standards are far unable to meet the needs of rapid development of standardization; setting technical standards is equal to completing inflexible tasks. Neglecting the important role of enterprises in standardization activities makes the technical standard difficult to take into effect. In addition, lack of coordination and communication among relevant departments creates difficulty in sharing the information resources. Therefore, the standards developed by the Chinese government usually lag behind the development of the market and advanced technology. Given the low standards and poor adaptation for the market, technological achievements are difficult for practical productive forces. Many "Chinese Standards" and "Industry Standards" have considerable gaps with the international standards, which eventually limit the quality of competition.

(2) Lack of mature management experience

Foreign professional patent management companies have played a considerable role in developing PLs. Patent management companies independent of patent holders and users are in a neutral position. These companies have rich experiences in patent licensing, have effective communication among standardization organizations, and have an accurate understanding of the market and technology. A professional patent management company can create new sources of revenue through an effective management program that assists businesses in recognizing, evaluating, and purchasing intellectual property, making their industry in line with technical standards, and operating in the market without government intervention. In terms of the AVS and IGRS alliances in China, the lack of mature management experience is a major bottleneck in developing domestic PLs. The Chinese government still dominates the AVS and IGRS by establishing management agencies.

5. Conclusion

The re-emergence of modern patent pools has profound economic and technological background. Modern PLs adapt to the new trends of technological development and technical standards in the globalization context. Many problems are still arising despite the vigorous development of the foreign PL, especially in the United States and Europe.

The existing AVS PL and IGRS PL are still in the preliminary exploratory stage. Linked with many legal roles,

technical services, and business operations, the PL management institution is a team mixed with diversified knowledge. China has a huge market advantage and has the ability to catch up with technology. The government plays a leading role in promoting enterprises to participate in PLs by developing industrial and technological policies, supporting major programs on technology, and regulating transnational abuse of IPRs. The government gives selective support to PLs led by domestic businesses with tax, fiscal, and financial policies. The innovative patent alliance management model should be set up in line with China's national conditions.

In addition, the government should provide a platform to convince enterprises to participate in the international technical standards, make enterprises share overseas market information to jointly develop the international market, and actively seek business cooperation with different formats in line with general international market rules. The government should also be directly involved in the formation of international technical standards to turn technological achievements into market standards and build a PL with essential patents of industry. By transforming its status from participants to rule-makers, China will develop a technology that can control and re-create the market.

References

Alexander Lee.2006.Examining the Viability of Patent Pools to the Growing Nanotechnology Patent Thicket [EB/OL]. University of Virginia,[2006-5-5].

Anne Layne-Farrar and Josh Lerner.2006.To join or not to join: examining patent pool participation and rent sharing rules [EB/OL]. Law and Economics Consulting Group (LECG), LLC - Chicago, IL Office, [2006-11-19]http://ssrn.com/abstract=945189.

Aoki, Reiko, Schiff, Aaron.2008.Promoting access to intellectual property: patent pools, copyright collectives, and clearing houses[J].R&D Management, 38(2):189-204.

Atsushi Kato.2004.Patent pool enhances market competition [J]. International Review of Law and Economics, 24 (2),255–268.

Carl Shapiro.2001.Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting [J]. Innovation Policy and the Economy,(1):120-150.

Carl Shapiro, Hal R.Varian.2000.Information Rules: A Strategic Guide to the Network Economy[J]. Telecommunications Policy, 24(5):457-459.

Corinne Langinier.2007.Patent Pool Formation and Scope of Patents[EB/OL].University of Alberta Department of Economics,[2008-7-9].

Department of Economics, University of Auckland,[2006-6-8].

DOJ.1999.Response to DVD 6C partnership's request for business review letter[EB/OL].

DOJ.2002.Response to 3G patent platform partnership's request for business review letter[EB/OL]. [2002-11-12]. http://www.justice.gov/atr/public/busreview/200455.htm.

European Commission Precedent to require ETSI to remove from their IPR holder's claim of essential IPR for ETSI standard[EB/OL]. European Commission ,[2003-12-11].

François Lévêque,Yann Ménière.2008.Early Commitments Help Patent Pool Formation. [EB/OL]. Ecoledes Mines de Paris-Centred'Économie Industrielle (CERNA),[2009-7-24].

GAULÉ, Patrick.2006. Towards Patent Pools in Biotechnology, [EB/OL].CDM Working Papers Series,[2006.4.10]. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1427751

Giuseppe Colangelo.2004.Avoiding the Tragedy of the Anticommons: Collective Rights Organizations, Patent Pools and the Role of Antirust [EB/OL].LE Lab Working Paper,[2004-3-10]. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=523122

HellerM.andR.Eisenberg.1998.CanPatentsDeterInnovation?The Antieommonsin Biomedieal

Hiroshi Kinokuni, Takao Ohkawa, Makoto Okamura. 2004. Patent Pools and the Allocation Rule[EB/OL]. Institute of Economic Research, Hitotsubashi University in its series Hi-Stat Discussion Paper Series with number d04-32,[2004-5]

[1999-6-10].http://www.justice.gov/atr/public/busreview/2485.htm.

http://gtwassociates.com/answers/commissionetsi.html.
http://iber.berkeley.edu/cpc/Conference/conference_papers/Choi-paper.pdf
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1121256
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1155762.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1308997
http://ssrn.com/abstract=715045
http://www.aea-eu.com/2008Tokyo/DOCUMENTS/Publication/Abstract/TSUKADA.pdf
http://www.finance.ritsumei.ac.jp/jp/07-0142008.2.Kinokuni,PP_and_AR.pdf.
http://www.ier.hit-u.ac.jp/pie/stage2/Japanese/d_p/dp2006/dp325/text.pdf
http://www.iir.hit-u.ac.jp/iir-w3/event/WP05-01aoki,%20nagaoka.pdf
http://www.law.berkeley.edu/institutes/bclt//pubs/merges/pools.pdf

Jay Pil Choi.2003.Patent Pools and Cross-Licensing in the Shadow of Patent Litigation[EB/OL]. Cesifo Working Paper No. 1070,[2004-8-17].

Joseph Farrell and Carl Shapiro.1988.Dynamic competition with switching costs. Rand Jouanal of Ecnomoics, (19):123-137.

Josh Lerner, Jean Tirole.2004.Efficient Patent Pools[J].American Economic Review, 94(3):691-711.

Josh Lerner, Marcin Strojwas,Jean Tirole.2007.The Design of Patent Pools: The Determinants of Licensing Rules[J]. RAND Journal of Economics,38(3): 610–625.

Joshua A. Newberg.2000. Antitrust, Patent Pools, and the Management of Uncertainty [J]. Atlantic Law Journal, 3(1):1-30.

Josh Lerner, Marcin Strojwas and Jean Tirole. 2003.The Structure and Performance of Patent Pools: Empirical Evidence. working paper [EB/OL]. Harvard University and NBER,[2003-1-11]. http://evan.lunarmania.com/idei002/doc/conf/sic/pa

Kim SH. 2004.Vertical structure and patent pools[J].Review of Industrial Organization, 25(3): 231-250.

Mark D. Janis. 2005. Aggregation and Dissemination Issues in Patent Pools.[EB/OL]. University of Iowa Legal Studies Research Paper,[2005-5-18].

Naotoshi Tsukada.2008.On Quality of Patent and Application Behavior Related to Patent Pool[R]. Naotoshi TSUKADA IIP Bulletin,[2008-12]

Nicholas Economides. 1996.The ecomnoics of networks[J].Interatinoal journal of lndustrial Organiaztion, 16(4):673-699.

Philip B. Nelson.2007.Patent Pools: An Economic Assessment of Current Law and Policy[J].Routers Law ,38 (2):538-572.

Reiko Aoki, Sadao Nagaoka. 2004.The Consortium Standard and Patent Pools[J].The Economic Review,55(4):346-356.

Reiko Aoki, Sadao Nagaoka.2004. Coalition formation for a consortium standard through a standard body and a patent pool. Institute of Innovation Research Working Paper[EB/OL]. IIR Working Paper WP#05-01,[2005-1]

Reiko Aoki. 2007. Clearing Houses and Patent Pools Access to Genetic Patents[EB/OL].

Research, Science,(280):698 — 701.

Richard J.Gilbert. Antitrust for Patent Pools: A Century of Policy Evolution. Stanford Technology Law Review[J]. STAN. TECH. L. REV,3.

Robert P. Merges.1999.Institutions for Intellectual Property Transactions: The Case of Patent Pools[EB/OL]. University of California at Berkeley, unpublished working paper, [1999-8].

Rudi Bekkers, Eric Iversen, Knut Blind.2006. Patent pools and non-assertion agreements: coordination mechanisms for multi-party IPR holders in standardization[c].Paper for the EASST 2006 Conference, Lausanne, Switzerland, August 23-26.4.

Ryan Lampe, Petra Moser.2008.Do Patent Pools Encourage Innovation? Evidence from the 19th-Century Sewing Machine Industry[EB/OL]. Working Paper Series,[2010-1-7].

Steffen Brenner.2004.Stable patent pools. [EB/OL]. Humboldt-University Berlin, Department of Economics, Institute of Management, Spandauer Strasse,[2004-12-1].

Steffen Brenner.2009.Optimal formation rules for patent pools[J].Economic Theory Economic Theory, 40(3):373-388.

StevenC.Carlson.1999.Patent pools and the antitrust dilemma[J].Yale Journal on Regulation. 16 (2):358-399.

Takenaka, T. and I. Nakayama. 2004. Will Intellectual Property Policy Save Japan from Recession? Japan's Basic Intellectual Property Law and Its Implementation through the Strategic Program[J]. Iic-International Review of Intellectual Property and Competition Law, 35(8), 877-99.

Wiebe, A. 1990. Intellectual Property Protection of User Interfaces in the USA and Germany[J]. Australian Computer Journal, 22(4), 133-39.

Wiebe, A.. 2000. Perspectives of European Intellectual Property Law[J]. International Journal of Law and Information Technology, 8(2), 139-65.