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Standardization Strategy of China — Achievements and Challenges

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Standardization Strategy of China

---- Achievements and Challenges

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Abstract : This paper explores China's standardization strategy after entering WTO and the standardization strategy's current status quo and its roles in economic development and innovation system construction in China. Through the analysis of the achievements of the Study on the Strategy of Technical Standards Project of the Ministry of Science and Technology (MOST) and the standardization strategies or plans established by governments at all levels, it concludes that the skeleton for standardization strategy thinking has been formed, a real standardization strategy has been established and implemented, and addresses achievements and current challenges.

Key words: standard, strategy, outline, innovation, market economy, challenge

1. Introduction

At the beginning of 21st century, China entered into the WTO. The MOST implemented Three Major National Strategies of Human Resource, Standards and Patents, and then invested in and supported the "Study on the Strategy of Technical Standards Development Project" in 2002. As the Standardization Administration of China (SAC) released *the Outline of Eleventh Five-year Development Plan for Standardization*, sector government departments released their own sector standardization plans and local governments released their local standardization strategies or plans. Thus a standardization strategy with Chinese characteristics began to take shape. The implementation of a standardization strategy has had substantial and positive effects on the

economy, societal development, and innovation system construction. But we must not lose sight of the challenges that China is still facing.

2. Historical Background and Environment

When the People's Republic of China was founded in 1949, the country started to implement the system of a planned economy. The standardization pattern that China subsequently developed came under considerable influence of the former Soviet Union. That is, the government formulated overall plans and managed the nationwide standardization. In 1956 when China established the State Scientific and Technological Commission, the Standardization Bureau was set up and the basic guidelines for standardization were formulated as: "Taking into consideration the practical circumstances of the country, and based on the experience of the national standards of the former Soviet Union and absorbing the advanced experiences in the world, the aim was to develop a system of national standards in the service of the country's industrial sector". The purpose of setting up the standards was to ensure and improve product quality, make effective use of materials and resources, and to enhance productivity. At that time the national system of standards consisted of national standards, ministerial standards, local standards, and factory standards.¹ In accordance with specific industry sectors, national standards examination committees were set up for the coal, petroleum, machinery, metallurgy, and chemical engineering industries, among many others. In 1957, China became a member of International Electrotechnical Commission (IEC).

Under the system of a planned economy, each of the industrial ministries (e.g. the Ministry of Machinery Industry) under the State Council was something like a large state-owned enterprise, so ministerial standards were enforced mainly for organizing production in the state-run enterprises that were within the jurisdiction of the ministry. National and ministerial standards were entirely compulsory standards that were enforced once promulgated.

However, the "Cultural Revolution" began in 1966 and the Chinese national economy began to deteriorate. This brought the country's standardization efforts to a standstill.

After the "Cultural Revolution," Deng Xiaoping became the advocate of reform and opening up China as the central government shifted its work focus in a modernization drive. Along with economic recovery, China's standardization efforts were restarted and developed. The State General Bureau for Standardization (SGBS) was established in 1978 and the China Association for Standardization (CAS) was set up one year later. Also in 1978, the country applied for, and regained its membership in the International Standardization Organization (ISO). Under the influence of international standardization organizations and the standardization drive of developed countries, SGBS began to set up "national standardization technical committees." By the end of 1999, 243 Technical Committees (TC) and 410 Sub-Committees (SC) had been established.²

However, the standardization administration system of the Chinese government was still the one that had been formed in the old days of the planned economy. The central government exercised overall control while each ministry was responsible for standardization of the industry that was

under its jurisdiction. This system was further strengthened by the *Standardization Law* promulgated in 1988. Meanwhile the standards system of China remained largely unchanged—standards were still classified into 4 levels: national standards, sector standards, local standards and enterprise standards³ in which the first three were formulated in the name of the government.

Influenced by the developed world, Chinese standards began to be categorized into compulsory and voluntary standards. According to the *Standardization Law*, “Those for safeguarding human health and ensuring the safety of the people and the property and those for compulsory execution as prescribed by the laws and administrative rules and regulations shall be compulsory standards; the others shall be voluntary standards.”⁴ The government started to reduce its intervention in the formulation of standards, as the principles of openness, transparency and consensus were introduced and implemented in all national standardization technical committees and subcommittees (TC, SC). This reflected the opinions of stakeholders.

One major event that greatly influenced China's progress in standardization was its entry into the WTO on November 23, 2003. Before and shortly after the country entered the WTO, people were very much concerned about China's standards and standardization. That was because, after entering the WTO, China realized it must acknowledge and abide by the WTO's rules, sign the Technical Barriers to Trade (TBT) agreement, accept the *Code of Good Practice for Standardization*, coordinate the existing voluntary national, sector and local standards with international standards, and make all technical regulations, standards and conformity assessment procedures meet the requirements of the TBT agreement. Obviously, to meet these commitments, China not only had to do a lot of specific work but also had to carry out reform in many crucial areas. Without reform, the country would not be able to meet the requirements of the WTO and therefore would not be able to integrate its economy into the global economy.

To date, China's standardization system has evolved into one in which the central government exercises unified administration and where the sector ministries and local governments take separate responsibilities according to their scope of jurisdiction. In this system, the representative body of the central government is the Standardization Administration of China (SAC) and the sector ministries/departments and local governments typically establish a standardization section within their body to manage their sector/local standardization. In this regard 'standardization management' means the management of project approval, final examination and issuance of standards. The formulation of standards is usually completed by experts organized by the above-mentioned “national standardization technical committees.” Typically, these technical committees are under the dual leadership of SAC and corresponding sector government departments. It should be noted that after government institutional reform, some industrial ministries such as the Ministry of Machinery Industry and the Ministry of Light Industry have been abolished. So the responsibility for managing the standards of those industries now lies with the corresponding industrial councils that were established later, such as the National Light Industry Council and the National Machine-building Industry Council. In addition, with the development of industrial associations in China, some industrial associations have gradually become the main force in formulating standards.

As the 1988 *Standardization Law* has its roots in a planned economy, its amendment, which has been put onto the agenda, is imperative. The amendment will undoubtedly be in conformity with the development steps of China's market economy and government institutional reform and will give great impetus to the country's standardization.

3. China's Standardization Strategy

The formal design and implementation of China's standardization strategy began with the project "Study on the Strategy of Technical Standards Development" sponsored by the MOST. Pushed by this major research project, government departments at various levels formulated their standardization development plans and relevant supporting policies. SAC formulated the *Outline of Eleventh Five-year Development Plan for Standardization*, and after that various sector government departments and local governments created their own standardization development plans or strategies. Therefore, China's standardization strategy is a comprehensive one, an integration of plans and strategies designed by government departments at various levels and tightly coupled to the national standardization strategy.

3.1 Technical Standard Strategy Projects of the MOST

At the end of the 20th century, the MOST proposed to implement the three major national strategies for science and technology development: human resources strategy, standardization strategy, and patent strategy. During the 10th five-year-plan period, the MOST allocated more than RMB 200 million to establish a "major technical standards research" program, which included 2 significant projects—"Study on the Strategy of China's Technical Standards Development" and "Study on the Construction of a National System of Technical Standards." More than 1,000 experts from standardization communities, scientific research institutes, and various industries and government bodies participated in the research projects. They investigated the history and status quo of both Chinese and foreign standardization and made comparative analyses, on the bases of which they completed and submitted, as the result of their studies, two major reports of the research projects and 35 supporting reports of sub-projects. The projects were assessed and accepted by the MOST in December 2005, and these reports were later formally published by the Standards Press of China.

The guiding ideology proposed by the reports was: ⁵

- taking the scientific outlook on development as the guideline,
- focusing on improving the adaptability and competitiveness of China's technical standards,
- adhering to the principle of government playing the guiding role, enterprise being the mainstay and market orientation,
- satisfying the needs of national scientific innovation, industrial and trade development and the construction of an all-round well-off society for technical standards, and

- supporting and guiding China's society and economy to develop in a well balanced and coordinated way, in which the principle of government playing the guiding role, enterprise being the mainstay and market orientation has become a consensus in China's standardization field.

The reports pointed out that there should be four changes (strategic orientations) in China's standardization efforts. That is, ⁶

- the development direction should be shifted to formulating standards that represent the achievements of China's independent innovation,
- the involvement in international standardization should be shifted to effective adoption and key competition,
- the standards system should be shifted to establishing a system based on voluntary standards, and
- the standardization development focus should be shifted to supporting standards that are conducive to building a harmonious society.

The project teams realized that although it is important to adopt international standards, it is more important to turn independently developed technologies into international standards. They also realized that China's standardization system should be changed into one that is based on voluntary standards and that is well adapted to the market economy, where the need for standards comes from the market, enterprises are the main drafter of standards, and the implementation of standards relies on the market mechanism.

The reports proposed two strategic objectives for the development of standardization in China, ⁷

- By the year 2010 a system of technical standards focused on key fields, rationally structured and well adapted to the market shall be established. The overall level of technical standards will have caught up with the international level, and among important international standards in key fields, the share of Chinese standards that reflects independent innovation will have been increased.
- By the year 2020, in Chinese technical standards the proportion of those reflecting the independently developed technologies will have been remarkably increased, the share of international standards formulated on the basis of Chinese standards will have been evidently enlarged, Chinese standards will have reached internationally advanced level, and China's technical standards in key fields will have reached a world-leading level. By then, China will have become a very important regional and international player in the activities of standardization, and Chinese technical standards will provide a strong solid support for China's social and economic development.

The reports suggested that China's standardization efforts should focus on the development of key technical standards in such fields as agriculture, manufacturing industry, modern service industry

and hi-tech industry, and technical standards that serve to improve public welfare, such as basic social undertakings, safety and security, health, environmental protection, natural resources and energy.⁸

Finally, the reports suggested adopting five measures:⁹

- to create a mechanism that promotes the content of independently developed technologies in technical standards;
- to establish a mechanism through which China participates in international standardization competition,
- to build a pattern of standardization that is based on voluntary standards;
- to improve the laws, regulations and policy environment for standardization; and
- to strengthen the construction of basic conditions.

The above-mentioned research project on standardization strategy sponsored by the MOST was an important historical event in China after its entry into the WTO. In fact, the project initiated a nationwide discussion about standardization, through which all social circles including industries, scientific research institutes, universities and governments at all levels greatly enhanced their awareness of standardization. The main points of view and grounds for argument of the research reports were based upon investigation into and comparative analysis of the status quo of standardization in major developed countries, China and some other developing countries. They were also based on the deep understanding and analytical research of the strategies of the standardization organizations at international levels in key developed countries.

It should be noted that research reports mainly served as suggestions for the development of standardization in China from an academic research perspective. As they were not formally issued by the government, the reports cannot replace the standardization strategies adopted by SAC, relevant sector governmental departments and local governments. But they exerted a significant influence on SAC and governments at various levels in future formulations of their standardization strategies and policies.

3.2. Standardization Strategy in Practice

“Crossing the river by feeling the stones,” a well-known saying by Deng Xiaoping, may be the most appropriate description of the implementation of China’s standardization strategy. When China entered the WTO in 2003, it thought that it would be enjoying more tangible benefits since it would be easier for its products to sell on the international market. But before long, messages came one after another, that exports met troubles in a number of countries.

- China’s food and textiles had to meet the requirements of extremely rigorous technical regulations and standards before being able to enter developed countries.

- China encountered the problems of intellectual property rights and technical standards in the trade of DVDs and mobile telecommunications products.
- China's electronics products met with EU RoHS Directive, etc.

China had considered technical standards a means to facilitate world trade, but it turned out that the first barrier it encountered when its products entered the international market was technical regulations and standards. The competitiveness of China's enterprises met with severe challenges and the Chinese government had to reconsider the significance and role of technical standards. Through several years' exploration and practice, the Chinese people gained a deeper understanding of the WTO/TBT Agreement, became more sensible in international trade disputes and acquired a great deal of valuable knowledge.

While adapting itself to WTO rules in the process of establishing and improving the system of market economy, China became more and more aware of the importance of standards. Since enterprises are the main players in the market economy, standards should be an important basis for them to produce qualified products that meet the requirements of the market so that they can obtain a competitive edge. The government also uses standards as an important tool for market supervision. Meanwhile, in the process of social and economic development, the Chinese government proposed a comprehensive development goal to build an innovative, harmonious and conservation-minded society. In achieving the goal, standards serve not only as a means to promote industrial progress and facilitate trade, but also a support for all-round sustainable social development.

In such a context, the standardization strategy that is being carried out in China is one by which the SAC, governments at all levels as well as standards research and formulation organizations across the country are constantly reviewing their experience and making new explorations.

3.2.1 A Strategy that National Standardization Supports National Economic Development

On October 27, 2006, the MOST issued the *National 11th Five-year Scientific and Technical Development Program*, which is of great importance to the development of science and technology during the 11th five-year period. All eight tasks prescribed in the *Program* contained requirements for standardization and the *Program* also proposed "fully implementing the IPR strategy and technical standardization strategy" to provide safeguard measures for the advancement of science and technology.¹⁰

Also in 2006, the SAC formulated the *Outline of Eleventh Five-year Plan on the Development of Standardization*, according to which, the overall standardization level of China will have reached that of moderately developed countries by the year 2010. To be specific, by then:

- China will have adopted at least 80% of relevant international standards.
- The annual number of standards formulated or revised will have been increased to 6000 from the current 2000.

- The average time needed for formulating one standard will have been reduced to two years from the present 4.7 years.
- The period of validity will have been reduced to within five years from today's 10.2 years.

The *Outline* also put forward eight key areas for standardization: agriculture, food and consumer goods safety, traditional industries, hi-tech and information technology, service industry, public security, energy conservation and environmental protection, inspection and detection. The *Outline* further prescribed five standardization research tasks: tracking study on advanced international standardization; study on how to combine standardization with technical innovation; study on testing standards for meeting technical barriers to trade; study on technical standards for public security; and study on basic standards for public benefits.¹¹

After the global economic crisis broke out in 2008, the Chinese government worked out a series of plans, one after another, for restructuring and revitalizing ten key industries. On June 5, 2009, the SAC, National Development and Reform Commission (NDRC) and the Ministry of Industry and Information Technology (MIIT) jointly issued the *Opinions on Implementing the Plans for Restructuring and Revitalizing 10 Key Industries and Further Strengthening Standardization Work*. Focusing on tasks and objectives set forth in those plans, the *Opinions* clarified the key areas for and the main jobs of standardization at present and for some time to come, and proposed well targeted implementation suggestions as follows:¹²

- First, the sense of urgency and responsibility in for and improving standardization in key industries must be enhanced.
- Second, greater efforts to develop and formulate new standards must be made.
- Third, the planning for standardization development in key industries must be identified.
- Fourth, encouraging key industries to actively take part in international standardization activities with an eye to the needs of the development of international trade for these industries.
- Fifth, the implementation of key industrial standards must be pushed forward.
- Last but not least, the implementation must be stressed and intensified.

As an agency authorized by the State Council to coordinate and administrate national standardization, SAC actually:

- adopts and implements a strategy that views standardization as an important support for national economic development;
- supports standardization in ten key industries; encourages enterprises to be the main players in formulating standards;
- promotes science and technology and industrial independent technical innovation;

- helps build a sustainable and conservation-minded society;
- facilitates domestic and foreign trade;
- formulates a unified policy for IPR and standardization; and
- propels China's participation in international standardization activities.

SAC strives for government financial support fund the formulation of national standards and support the participation of Chinese experts in international standardization activities so as to enhance the status of China in international standardization organizations.

3.2.2 A Strategy that Sector Standardization Support Independent Industrial Innovation

Since China's entry into the WTO, sector government departments in charge of different industries have been paying more and more attention to standardization. Different industrial standardization strategies are set forth in the standardization development plans of these government departments. In 2005, *the National Standardization Plan 2005-2010 for the Logistics Industry* was issued jointly by SAC, NDRC, the Ministry of Commerce (MOFCOM), the Ministry of Railways (MR), the Ministry of Communications (MOC), Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), Civil Aviation Administration of China (CAAC) and National Bureau of Statistics (NBS).

In 2006, the *Standardization Development Plan for Seawater Utilization* was jointly issued by SAC, NDRC, MOST and State Oceanic Administration (SOA).

In 2007, MOFCOM issued the *11th Five-year Standardization Development Plan for Commodity Circulation*. Also in 2007, the *Outline of Innovation and Development Plan 2006-2020 for Traditional Chinese Medicine* was jointly issued by 16 departments including MOST, the Ministry of Health (MOH) and State Administration of Traditional Chinese Medicine (SATCM).

On November 6, 2008, the *Standardization Development Plan 2008-2010 for Conservation and Comprehensive Utilization of Resources* was jointly issued by 15 departments including SAC and NDRC, nine industrial councils (associations) and some relevant group corporations.

In 2009, the *National Standardization Development Plan 2009-2013 for the Service Industry* was jointly issued by 24 departments including SAC and NDRC.

From the perspective of each sector industry, these Plans have defined the guidelines, main objectives, main tasks and main measures of their standardization for the years to come, established a general framework for the system of standards, pointed out the key areas for standardization and set the tasks of formulating or revising some of the most important standards. Some of these Plans have also set forth safeguard measures and suggestions. The standardization strategies of different sector government departments stress that sector standards should play an active role in industrial development, strongly advocate that independently developed technologies should be integrated into national or sector standards, and if possible, be recommended to international organizations to turn into international standards. With their advantages, sector government departments in charge

of different industries have made every effort to mobilize as many governmental and social resources (including enterprises) as possible to support sector standardization.

The sector government department (e.g., the MIIT, the Ministry of Housing and Urban-Rural Construction (MHURC), etc) in charge of an industry has close relations with the enterprises (especially state-own enterprises) within the industry and bears the obligatory duty to support these enterprises to build up their core competitive power. Therefore, once these departments find that any standard put forward by a Chinese enterprise relates to an independently developed technology, they will immediately provide strong support, although the standard is only a voluntary one. It is explicitly proposed by the MIIT, in the *11th Five-year Plan and Outline of Medium- and Long-term (2020) Plan of the Information Industry for the Development of Science and Technology*, that an independent-innovation-based standardization strategy should be implemented.¹³

3.2.3 A Strategy that Local Standardization Supports Urban-Rural Construction and Local Industrial Development

Local standards are a constituent part of the Chinese standards system. Therefore, the Quality and Technology Supervision Bureaus of provinces, municipalities and autonomous regions, which are the competent authorities responsible for the standardization in their respective administrative regions, promote local economic and technological development by pushing the formulation and implementation of local standard strategies.

In May 2007, the government of Shenzhen formulated and issued a programmatic document—*The Programs for Implementing Shenzhen Municipal Standardization Strategy*. This was the first in the country to set forth and implement a “Municipal Standardization Strategy,” extending standardization into such key areas as urban construction, community construction and administrative services. According to this document, by the year 2010:

- a standardization management and operation system will have been established in Shenzhen, where “the government exercises leadership, enterprises are the main players, intermediary organizations provide support and all social circles participate;”
- a fairly complete system of standardization will have been established preliminarily in such key areas as independent innovation, circular economy, and urban management & services;
- the city’s standardization level will have reached the leading level among big and medium cities nationwide; and
- Shenzhen will have become a standardized powerful city with a strong awareness and high level of standardization, good development environment, huge innovation capability, complete system of support and services and rich human resources.

Also in 2007, the government of Shanghai issued *The Outline of Shanghai Municipal Standardization Development Strategy*, with an aim to give full play to standardization in providing technical support for the city’s social and economic development and to boost its international competitive power. The

Outline emphasizes standardization in the areas that are closely related to citizens' daily life, such as the areas of community management and services, social welfare, and social security. The document proposes establishing a system of standards for urban traffic in underground spaces, raising the standardization level of culture-related public facilities in terms of construction, management and services, speeding up the formulation and revision of standards for environmental quality and pollutant emission control, and promoting the implementation of environmental management system standards.

Following the above-mentioned two cities, the governments of Beijing, Jiangsu, Zhejiang, Shandong, Henan and Shaanxi have also formulated and issued their standardization strategy outlines. Closely related to the "Study on the Strategy of China's Technical Standards Development" sponsored by the MOST, these strategy outlines are the inheritance and extension of national-level research achievements, indicating that local governments have attached great importance to the work of standardization. In addition, by paying more attention to the industrial characteristics, economic development level and people's needs in their respective localities, these strategy outlines are more operable.

To support their standardization strategies, the governments of provinces, municipalities and autonomous regions have introduced various policies and taken different incentive measures to promote the cause of standardization, encourage local enterprises and government-affiliated institutions to undertake the formulation and revision of national standards, shoulder the work of the secretariats of national standardization technical committees, submit proposals to ISO for formulating international standards and conduct standardization research. These policies and measures have greatly aroused the enthusiasm of the local people who are engaged in the cause of standardization and provided an institutional guarantee for local standardization development.

4. Achievements of Implementing Standardization Strategy

4.1 The Overall Strength of Chinese National Standards Increased

Since the efforts of SAC, during the period of 2006-2008 the central government allocated RMB 300 million for standardization, mainly for the formulation and revision of national standards. As a result, the number of national standards formulated or revised has risen sharply over the past few years. In the year 2008, SAC approved and issued 6,373 national standards and national standard reference materials, in which 5,946 were formulated or revised standards and 427 were newly-developed standard reference materials. Among the 5,946 national standards approved and issued, 2,287 were formulated, accounting for 38.46% and 3,659 were revised, accounting for 61.35%; 594 were compulsory, making up 9.98%, 5,317 were voluntary, making up 89.42% and 35 were national standardization technical guidance documents, making up 0.58%. By the end of 2008, Chinese national standards had totaled 22,931, in which 3,111 were compulsory, accounting for 13.56%, 19,675 were voluntary, accounting for 85.8%, and 145 were national standardization technical guidance documents, accounting for 0.63%. Also by the end of 2008, Chinese national standard

samples had totaled 1,491. In the year 2008, a total of 3,097 sector standards and 2,139 local standards were registered and put on records. By the end of 2008, an accumulative total of 39,686 sector standards and 14,142 local standards had been registered and put on records. There has been a remarkable increase in the number of national standardization technical committees over the past few years. Up to the end of 2008, there had been 444 national standardization technical committees (TC) and 586 sub-committees (SC), 149 TCs and 183 SCs were approved and established in the year 2007.

4.2 Standards Play an Important Role in Supporting Industrial Development and Independent Innovation

Heartening standardization achievements have been made in Chinese new and high technology fields. In IT standardization for example, remarkable development and improvement have been accomplished in standardizing the transmission network, service network, access network, supporting network, new telecommunication services, remote message processing and multimedia communication, and a scientific and complete system of telecommunication standards has been basically established. Standardization progress to varying degrees has been made in the areas of energy resources, aerospace and bio medicine. Major breakthroughs have been made in standardization in key fields. The rapid development of Chinese construction, iron & steel and communications industries reflects the many achievements of the standardization work.

By the end of 2007, a total of 184 national standards had resulted from independently-developed technologies, mainly distributed in the fields of new and high technology, communications, equipment building and new materials. Also by the end of 2007, 16 patent-related national standards had been formulated, in which nine were AVS standards, one was a digital TV standard, one was an EPA system structure and communication standard used for industrial measurement and control systems, three were agriculture and food standards, five were WAPI standards and one was a UOF standard for Chinese office document format.

4.3 China's Status in International Standardization Was Greatly Elevated

SAC has obtained good results in encouraging Chinese experts to take part in international standardization activities. In 2008, China became one of six permanent members to the governing ISO Council, signifying a significant elevation of its status and a major improvement of its image in this organization. In the previous year, Professor Song Mingshun of China, Jiliang University won the ISO Award for Higher Education Standardization. In 2009, three Chinese experts, Ouyang Jinshong, Cui Bo, and Zhao Ying won the IEC 1906 Award. Up to the end of 2008, there had been 31 secretariats of ISO or IEC TCs or SCs where Chinese experts held the post, in which 26 were ISO secretariats (12 TCs and 14 SCs) and 5 were IEC secretariats (4 TCs and 1 SC). In the end of 2008, twenty-two TC or SC chairmen (vice-chairmen) of ISO or IEC were Chinese, in which 19 were TC or SC chairmen (vice-chairmen) of ISO and three were TC or SC chairmen (vice-chairmen) of IEC.

In 2008, China initiated and submitted 22 international standard proposals to ISO and IEC, of which 10 went to ISO and 12 to IEC. By the end of 2008, China had already submitted 164 international standard proposals to ISO and IEC, in which 64 had become international standards.

5. Challenges for the Standardization Cause of China

5.1 Legal and Regulation System Needs Strengthening

As has been mentioned above, China's *Standardization Law* was promulgated in 1988. At that time, the country was in the early years of reform and opening up and was developing a "planned commodity economy." Naturally, the *Law* was designed to serve economic development in that stage. It is undeniable that the *Law* made a substantial contribution to the improvement of China's legal system for standardization. Under the planned economy, all standards were mandatory. The *Standardization Law*, however, divided standards into mandatory and voluntary ones, which was remarkable in China's standardization history.

But now it is obvious that the *Law* can no longer adapt to the development of China's market economy. The system of standards established under the conditions of the "planned commodity economy" is no longer able to meet the requirements of the market economy and the mandatory standards can no longer play the role of technical regulations. Of the four levels of standards, (i.e. national standards, sector standards, local standards, and enterprise standards) the formulation of the first three is presided over by the government. That is to say, the government has the right to preside over the formulation and issuance of the three levels of standards that include all the mandatory and voluntary ones.

Although mandatory standards can be regarded as technical regulations, the Chinese legal system does not acknowledge the existence of such regulations. Furthermore, as the initiation, formulation, review and issuance of mandatory and voluntary standards are all conducted in the same standardization system, there is neither argumentation as to whether those regulations are needed nor confirmation of legal procedures for their final evaluation and issuance. Besides, the *Standardization Law* did not give industrial associations a legal status to formulate standards. All these are inconsistent with the principle of market economy.

It is imperative that china enact a new standardization law that is compliant with its economic development and supported with related regulatory documents and management systems, so as to create a sound legal environment for standardization. Now, the existing *Standardization Law* has come into the legal procedure of revision and results will be seen before long.

5.2 Standardization Pattern Should Be Improved to Meet the Requirements of Market Economy

A market-based economic system has been established and gradually improved in China over the past three decades through reform and opening up, so too should china's standardization management adapt to the development of the market economy by taking the path of innovation. In countries with a developed legal system, most technical standards are voluntary and formulated based on market mechanisms where implementation of standards mainly relies on the "locking effect"¹⁴ of market competition instead of governmental enforcement. Therefore, the development of standardization in China should break through the restriction of the traditional system where the government is the only main body to organize and preside over standardization activities. On the one hand China should make enterprises be main players in standardization and, on the other hand, China should give full play to the industrial consortia and alliances, through institutional and managerial innovation.

Nowadays, some industrial associations in China, such as CCSA, CEEIA and IRGSA, have become the main force in formulating national and sector standards. But they can only formulate national and sector standards under the leadership of the government rather than their own association standards. To make standards more relevant to the market, the central government should at first permit associations to independently formulate their own standards. Just as it loosened control over enterprises at the early days of reform, now the government should also loosen its control over associations with respect to standardization to let the market foster and develop a system of voluntary standards. Only through the market mechanism of selective preference can voluntary standards that meet market needs come into existence. In the meantime, alliance or consortia standards are emerging in China especially in the field of new and high technology, such as the IGRS and AVS standards. How to give these standards full play in establishing a standardization management pattern that meets the requirement of market economy is an important challenge for China.

In March 2008, the sixth institutional reform of the State Council was completed with the establishment of the Ministry of Industry and Information Technology, the Ministry of Transport, the Ministry of Human Resources and Social Security, the Ministry of Environmental Protection, and the Ministry of Housing and Urban-Rural Construction. These ministries have paid much more attention to the work of standardization and each of them has been granted clear authority over standardization. On the one hand, the positioning of standardization work reflects the ideology that different sectors should develop their technical standards by relying on their own technical strength under the leadership of relevant government ministries. On the other hand, the focus reflects the urgent need that China's standardization should be systematically integrated at a national level. With respect to standardization management, it is a huge challenge for China to rationalize the relationship between standardization management and standardization activities as well as between national management and ministerial management.

Government departments at all levels should gradually shift to a new working pattern where they are no longer responsible for organizing the formulation of voluntary standards but responsible for formulating mandatory standards (technical regulations). Voluntary national standards should still be managed and coordinated by SAC in a centralized way and the main bodies for formulating these standards should be extended to all stakeholders by improving the system of standardization technical committees. Association standards should be conceived and developed in the market economy to become a supplement in the existing system of national standards and an important element in activating market activities.

6. Conclusions

(1) The Technical Standard Strategy Research Project of the MOST conducted comprehensive research on standardization history and current status in China, the standardization activities of international standardization organizations and the developed countries, as well as the intellectual analysis and comparison; put forward constructive suggestions for implementing standardization strategies in China, and has had great impact on the plans or strategies released by government at all levels afterward.

(2) The standardization administration in China is a system with the divided responsibilities of government agencies at all levels. The emphases of standardization strategies implemented by central, sector and local governments are different. As a consequence, the real standardization strategy is the comprehensive result of implementing all the standardization strategies by different government agencies.

(3) The standardization strategy of China can be outlined as: government as the driving force, enterprises as the mainstay, and market as the guide. It includes stepwise transition to the voluntary standard system to adapt the needs of market economy; improving market relevant national standards and sector standards; rationalizing the relations between standards and technology innovation, protecting of intellectual property, and upgrading industry, focusing on harmonious development; adopting international standards effectively; participating in international competition on selection, and supporting submitting proposals from independent innovational technologies.

(4) Standardization in China has developed to a considerable scale and the capacity to participate in international standardization has gradually improved. After a quantitative increase of domestic standards, TCs and SCs, technical experts, more attention is currently paid to the quality of development. The standardization of China has made its due contribution to the development of the economy become international and a very important part of international standardization.

(5) The deep rooted challenge that China standardization development is facing is the innovation of standardization administration system. Transformed from the planned economy, the standardization administration system and the four level standards system remain vestiges of China's planned economy and thus cannot adapt to the needs of the market economy. Three of the four levels of

standards that the *Standardization Law* ordains are government standards. And currently the legal status of association standard in China is still not recognized.

(6) The revision of the *Standardization Law* will decide the direction of the reform of standardization system. In China, the standardization administration system will be readjusted gradually with the development of market economy and the deepening reform of government.

References

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- ¹ Wang Ping, *Development Opportunities and Challenges Faced by China*, the Supported Report of China's Standardization Strategy Project , 2005
 - ² Encyclopedia of China Publishing House(ECPH), *Encyclopedia of Quality Standardization Metrology* 2001, P28
 - ³ State Council, *STANDARDIZATION LAW OF THE PEOPLE'S REPUBLIC OF CHINA*, 1988, Item 6, Chapter 2
 - ⁴ State Council, *STANDARDIZATION LAW OF THE PEOPLE'S REPUBLIC OF CHINA*, 1988, Item 7, Chapter 2
 - ⁵ Zheng Weihua etc, *Research on China's Standardization Strategy*, Standard Press of China, 2007, P14
 - ⁶ Zheng Weihua etc, *Research on China's Standardization Strategy*, Standard Press of China, 2007, P16
 - ⁷ Zheng Weihua etc, *Research on China's Standardization Strategy*, Standard Press of China, 2007, P19
 - ⁸ Zheng Weihua etc, *Research on China's Standardization Strategy*, Standard Press of China, 2007, P20
 - ⁹ Zheng Weihua etc, *Research on China's Standardization Strategy*, Standard Press of China, 2007, P23
 - ¹⁰ The MOST, *The National 11th Five-year Scientific and Technical Development Program*, 2006.11 <http://www.most.gov.cn/tztg/200610/P020061031626562001491.doc>
 - ¹¹ The SAC, *Outline of Eleventh Five-year Plan on the development of Standardization*, 2006.3, <http://www.sac.gov.cn/templet/default/ShowArticle.jsp?id=2522>
 - ¹² The NDRC, MIIT, SAC, *Opinions on Implementing the Plans for Restructuring and Revitalizing 10 Key Industries and Further Strengthening Standardization Work*, <http://www.sac.gov.cn/templet/default/ShowArticle.jsp?id=5163>
 - ¹³ The MIIT, *Safeguard Measures, Eleventh Five-Year Plan for Science and Technology Development of Information Industry and Outlines of Mid-and-Long Term Plan 2020*, 2008 <http://www.miit.gov.cn/n11293472/n11295040/n11478852/11637554.html> ;
 - ¹⁴ Song Hualin, *Promoting the system reform of technical standards-primary study based on Administrative Law, Science, innovation and harmony: paper collection of academic annual meeting of society and science in Tianjin* , Tianjing Remin Press, 2006.11, P219-P227