

# *Analysis on China's International Standardization Strategy Based on the SWOT-PEST Analysis Paradigm*

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**Abstract**—International standardization is an important component of China's standardization strategy, but it is also a weakness in China's standardization work. To make breakthroughs in international standardization, we must have a clear strategic positioning of international standardization. In this paper, the author analyzes the internal and external environment of the development of international standardization in our country, and puts forward the strategic positioning of our country's international standardization development in the new period by using SWOT-PEST analysis framework. This paper holds that China should take the offensive strategy and those central enterprises, societies, associations, alliances and research institutions are the most important participants in carrying out international standardization. The international standardization of our country should take inter-governmental international standard organizations as the core and encourage the decentralized participation of all stakeholders in standardization activities of all kinds of standard organizations abroad.

**Keywords**—international standardization, SWOT, PEST, strategic positioning

## I. INTRODUCTION

Since the end of the twentieth century, major developed countries and some developing countries have made standardization strategies or international standardization strategies. At the heart of major developed countries' standardization strategies are to contend for the dominance in the competition of international standardization and make efforts to be Secretariats and presidents of more technical organizations (TC, SC) under international standardization organizations concerning their national interests, lead the development of international standards closely related to the industrial and social development and hold the chairs of presidents, vice presidents and other leading posts of international standardization organizations (ISO, IEC, ITU). Developed countries and regions have very clear objectives and relatively concentrated focus while participating in the international standardization competition. They mainly focus on public areas, such as health, safety, environment and others, as well as the high and new technology, services and other emerging areas.

Facing the reform brought by strategic emerging industries, the US revised its standardization strategy. Meanwhile,

centering on its strategic emphases, it adjusted the architecture and working methods of relevant technical organizations and achieved good results. [1] In German "Industry 4.0", the country puts forward its standardization strategy, which believes that standards are important tools to lead the development of industries, and that with the research and development (R&D) of advanced technologies, the synchronization of standardization has even been antedated. [2] The US, European Union (EU) and Japan have given priority to the international standardization strategy in their overall standardization development strategies and actively participated in international standardization. [3] With independent innovation and globalization as its important foundations and conditions, China's standardization strategy is facing unprecedented opportunities and challenges. [4] The implementation of Indonesian National Standardization Strategy for 2015-2025 will effectively promote the pace of standardization in Indonesia, and further improve the country's innovation ability and the international competitiveness of its product. [5] For China, standardization plays an important role in promoting its social and economic development. Furthermore, improving enterprise standards through the market can better support economic transformation and upgrading and the changes of government functions and secure the implementation of the going global strategy by enterprises and the construction of a quality power. [6] WANG Ping and LIANG Zheng (2014) think the fact that the current recommendatory standard system of our country is completely under the government's control has already become the obstacle hindering industrial development, which, in some cases, will greatly reduce the effects of our standardization strategy. The market-oriented reform of our standardization and allowing non-governmental organizations (NGO) to participate in setting industrial standards have already become the key to implement our standardization strategy. [7] YU Chao (2015) believes that the standardization strategy should have an international outlook and be adjusted at the right moment to reflect the latest economic and social development and different interest demands of stakeholders. In addition, the standardization strategy should properly coordinate the relationship between industrial policy and competition policy to avoid market barriers. For enterprises, they are also facing the problem of implementing standardization strategies. [8] DENG Zhou (2014) expounds different standard strategies of

technology leaders and technology overtakers with the TD-SCDMA as an example. [9] QI Xin and WANG Ce (2015) hold that medium and small enterprises (SMEs) must increase their awareness of technical standards and take the initiative to join the process of technical standardization so as to digest and absorb the positive impetus function of technical standards. [10].

## II. SWOT-TEST ANALYSIS OF THE DEVELOPMENT STRATEGY OF CHINA'S INTERNATIONAL STANDARDIZATION

### A. Strengths (S)

#### 1) Political Factors

- The Communist Party of China (the Party) and the state attach great importance to international standardization. General Secretary Xi Jinping and Premier Li Keqiang and other Party and state leaders have made important instructions for the international standardization work many times. A series of important documents issued by the State Council have also made clear requirements for the work in this area.
- Governments at all levels and relevant departments shall incorporate international standardization into their policies and plans. For example, *Vision and Proposed Actions Outlined on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road, Standardization of Connection Action Plan for 'One Belt One Road' Plan 2015-2017* and other planning documents regard international standardization as a priority theme and key support object. More than 20 provinces nationwide have formulated standardization strategy plans.
- The "whole-nation system" is a powerful guarantee for China to carry out international standardization. A standardization management system under the centralized management and division of labor by the government can better demonstrate the advantages of "concentrating on accomplishing major tasks". The success of the 39th ISO Conference in Beijing has fully embodied the advantages of the system.

#### 2) Economic Factors

- China's sustained and rapid economic development and huge market space are strategic advantages and resources for us to compete for the dominance and voice of international standards. With its GDP steadily ranking the second in the world, China has become the greatest power in goods trade and a major power in foreign investment. China's industrial restructuring has made marked progress and its service industry has become its largest industry. Meanwhile, with the deeper integration of industrialization and informatization, China's industry is developing towards the mid-high end, coupled with the significant improvement of agricultural overall production capacity.
- China's international standardization has a certain competitive strength in some strategic emerging industries. In Internet of Things (IOT), smart grid,

electric vehicles (EV), semiconductor lighting and other emerging industries, we have made remarkable achievements in international standardization. Some standards independently developed by our country have been made international standards, thus we now have a say in the international standards of relevant sectors.

- In traditional industries where China has comparative advantages, we have made breakthroughs in international standardization. China makes full use of the huge capacity of home market and the opportunity created by the transfer of the international manufacturing industry and promotes the elevation of Chinese standards to international standards in home appliances, shipping, metallurgy, nonferrous metals, engineering machinery and other industries where we have industrial scale advantages, as well as in traditional Chinese medicine (TCM), tea, fireworks, firecrackers and other traditional industries.

#### 3) Social Factors

- The public's awareness of standardization has gradually increased. With the popularization and continuous promotion of standardization, plus the increasing quality of the public, the whole society's awareness of standardization is increasing. Moreover, media and public opinion are obviously paying more attention on standardization.
- Societies, associations, alliances and other social organizations have developed rapidly and group standardization has been carried out smoothly. The introduction of Directive Opinions on Cultivating and Developing Group Standardization and the rapid development of China's group standardization have injected fresh blood for the construction of China's modern standard system. Meanwhile, these social organizations will become an important force in China's participation in international standardization.
- Enterprises pay more attention to the standardization work. Domestic enterprises generally recognize the importance of technical standards, for example, many enterprises in Guangdong, Zhejiang and other economically-developed regions regard technical standards as their core competitive power and are increasingly enthusiastic to take part in international standardization.

#### 4) Technological Factors

- The connection between standardization and scientific research is becoming increasingly closer and technical support is playing an increasingly important role. Through National Science and Technology Major Projects, National Key Technologies R&D Programs, National High-tech R&D Program of China (863 Program) and other important scientific and technological plans support the development of technical standards and are strengthening the efforts to do so. New national key R&D programs have also increased the support for standardization technical

innovation. Local science and technology sectors also attach importance to and support the development of technical standards.

- China has a large number of standardization scientific institutions. So far, the number of institutions engaged in standard research in China totals 277, among which 192 are standardization research institutions affiliated to ministries and commissions under the State Council, confederations of trade union and group companies and 85 quality and technology supervision bureaus at levels of provinces, autonomous regions and municipalities directly under the central government.
- Key enterprises are improving their independent innovation ability. More and more enterprises are participating in the development and revision of industrial, national and international standards, which apparently have higher quality and include a large number of international standards with proprietary intellectual property rights (IPR) like Intelligent Grouping and Resource Sharing (IGRS), 3G, Audio Video Coding Standard (AVS).

## B. Weaknesses (W)

### 1) Political Factors

- China lacks a top-level design for participating in international standardization. National authorities have not made any strategic plan to systematically and continuously carry out international standardization, which affects our country's standardization cause, especially the rapid development of international standardization.
- There exist systems and mechanisms that are not suitable for the development of standardization. For example, China's laws and regulations relating to standardization are relatively backward, coordination mechanisms of international standardization are to be improved, participation in the coordination of international standardization is insufficient, resources and forces are decentralized, and the advantages of "whole-nation system" in international standardization has not formed yet. So it is difficult for China to make overall breakthrough in some key and major areas.

### 2) Economic Factors

- We are still faced with obvious structural contradictions of industries and arduous tasks of vigorously developing new and high technology and promoting the transformation and upgrading of traditional industries.
- We lack continuous financial support for international standardization. Due to the high input cost, long cycle, uncontrollable results and benefits of the development of international standards, some enterprises are unwilling to go further during that process.

### 3) Social Factors

- The public's awareness of standardization is weak. The public does not know much about standardization in

daily life underestimates its importance and generally lacks such awareness.

- China lacks high-end inter-disciplinary talents in international standardization, who are the premises and foundation to carry out international standardization activities. The widespread shortage of talents in international standards, especially high-end talents, leads to deficient capacity of enterprises in their actual participation in the development of international standards.

### 4) Technological Factors

- The interactive mechanism during the whole process of our technology plan implementation and standard preparation and revision is not perfect. Worse still, the mechanism for scientific and technological innovation achievements to incessantly turn into technical standards and even international standards has not been formed yet.
- There is still a big gap between China and developed countries in terms of the overall level of technology. The proportion of technology introduction, digestion, absorption and re-creation is still very high in all the types of innovative technologies. As the phenomenon of overestimating introduction while underestimating absorption is still quite common, industrial independent innovation needs to be strengthened.

## C. Opportunities (O)

### 1) Political Factors

- Standardized reform has created a good institutional environment for the development of international standardization in China. Standard-driven reform means we need to get rid of the shackles of standardization development systems and mechanisms. The Plan for Furthering the Standardization Reforms (Reform Plan for short) explicitly sets forth the need to improve the level of international standardization in our country and suggests the main approaches to achieve it.
- The revision of the standardization laws provides a good legal environment for the development of international standardization in China. The newly revised standardization laws take meeting the needs of economic and social development and dealing with the relationship between the government and market well as its goals. By combining national conditions with advanced experience borrowed from foreign countries and taking enhancing operability and effectiveness as the principle, they affirm the achievements of standardization reforms in the form of laws.

### 2) Economic Factors

- The adjustment of global industrial structure is advancing quickly. The information industry featured by the all-round application of Internet, cloud computing and information technologies keeps infiltrating into the economic sphere. 3D printing technology, Internet of Things (IOT), cloud computing

and other industries are reshaping the pattern of industrial development, and the rise of the Internet is changing the operation model of traditional industries. Moreover, all countries pay more attention to the development of the high technology industry and regard it as new point of economic growth.

- China has already initiated "the Belt and Road Initiative" strategy and will start the full deployment and implementation during "the 13th Five-Year Plan". Under "the Belt and Road Initiative" strategy, China will combine domestic development with openness to the outside world to promote the formation of an all-round openness pattern. Additionally, China is expanding the scope of foreign economic cooperation and quickening its pace of "going global".
- Both the active promotion of re-industrialization by the US and EU and the rapid advancement of industrialization generate a strong demand to attract foreign capital. This provides good opportunities for our country to promote Chinese standards "going global" by making better use of the R&D, technological, brand and other high-end resources of international market and developed countries and the energy resources, labor force and other essential factors through "going global".

### 3) *Social Factors*

- Chinese experts serving as leaders in the three major international standardizations, namely ISO, IEC and ITU, provides a golden opportunity for our country to make breakthroughs in international standardization.
- In the new century, the fundamental and strategic role that standardization plays in social and economic development is becoming increasingly prominent. The extent of standards is developing from technologic fields to public service and social management fields and standards have become strategic weapons in international competition.

### 4) *Technological Factors*

The new technological revolution provides catch-up effects and the advantages of backwardness for the international standardization of our country. Reforms in information technologies, such as big data and social networks; automation and manufacturing technologies, such as 3D printing and robots; resource technologies, such as biological energy sources; medical and health technologies and other technological areas may be breakthroughs in leading a new round of technological revolution. New technological revolutions have brought permeability influence on our country and formed new industries, products, types of operation and business models, which brings new opportunities to our country's industrial transformation and upgrading. Meanwhile, as the catch-up effects of our country still exist, we will draw support from the advantages of backwardness and realize corner overtaking in international standardization.

## D. *Threats (T)*

### 1) *Political Factors*

- Western developed countries led by the US contain China in all aspects, including in the field of international standardization. Western powers still use old ideologies as the standards to distinguish friends and foes and set up obstacles and barriers to China's efforts to seek breakthroughs in international standardization.
- In the area of standards, western developed countries increase the offensive against China. Against the background that the situation where the financial crisis led to slow economic growth still exists and developed countries have lost their absolute advantages over emerging countries in the contest of hard power, western powers shift the game focus to standards, rules and other soft fields and show an obvious intention to transfer internal economic difficulties to the outside world.

### 2) *Economic Factors*

- Western developed countries have long completed the patent and technology layout in traditional industries. Not only that, developed countries have re-doubled their efforts to compete for the right to develop international standards in strategic emerging industries to make sure those standards can secure the interests of their own industries.
- From a medium and long term point of view, the situation where the global economy keeps growing at a medium-low speed cannot be changed quickly and will be under adjustment for quite a long time in the future, which pose a big challenge to the growth pattern of our long-term reliance on export from the US and European markets.

### 3) *Social Factors*

- The ecosystem pattern of international standardization has basically been formed, in which the developed countries are at the heart of the system and have more powerful voice in international standards. Chairmen, Vice Chairmen and Secretary Generals of the three major international standardization organizations, Chairmen, Secretary Generals and other leadership positions in technical committees are mainly held by experts from the US, Germany, Britain, France, Japan and other countries. These all form a huge obstacle to the breakthrough of China's international standardization.
- Foreign standardization professional bodies, alliances and organizations expose threats on our country. The standards of ASTM, ASME, UL and other professional US associations with long histories have a very big influence in relevant fields. Worse still, these organizations regard the standards created by them as international standards. Objectively, the standardization activities of these professional bodies have already become the threats to the breakthrough of our international standardization.

4) *Technological Factors*

- The international high-end technology blockade and the medium- and low-end technology exchange coexist and technologic monopoly prevails. International standards, especially those involving proprietary technology, pose a great threat to China's industrial development and breakthroughs in international standards. For example, in the "DVD Charge Event", the issue of key technology patent led to the collapse of the entire DVD industry in China.
- Western developed countries raise market access threshold through creating technical standards, barriers and other means to control markets and attack and exclude opponents, for example, the Wenzhou Lighter Event. In addition, developed countries have higher and higher requirements for technical standards in noises, electromagnetic pollution, energy saving, compatibility, security and other aspects, which has a significant impact on the export of our enterprises' products.
- Trade-related intellectual property agreements (TRIPs agreements) show obvious traces of policies advocated by western developed countries and to a larger extent, reflect the interests of developed countries. They have strengthened the IP protection to a considerable extent and increased the intensity of technological competition.

III. THE MATRIX AND SELECTION OF THE DEVELOPMENT STRATEGY OF CHINA'S INTERNATIONAL STANDARDIZATION

A. *The Matrix of the Development Strategy of China's International Standardization*

The SWOT analysis matrix for creating development strategies are constructed according to the SWOT-PEST analysis of China's international standardization development strategy. The selection of such strategy is actually the process of strategic matching based on the combination of the internal conditions and external environmental factors for the development of international standardization in our country (See the table 1).

TABLE I. THE SWOT ANALYSIS MATRIX OF OUR INTERNATIONAL STANDARDIZATION DEVELOPMENT STRATEGY

Internal Conditions		Strengths	SP	Weaknesses	WP
			SE		WE
External Environment			SS		WS
			ST		WT
Opportunities	OP	SO combination strategy (Offensive strategy)		WO combination strategy (Turnaround strategy)	
	OE				
	OS				
	OT				
Threats	TP	ST combination strategy (Moderately offensive strategy)		WT combination strategy (Defensive strategy)	
	TE				
	TS				
	TT				

In Table 1, SP refers to political factors, SE economic factors, SS social factors and ST technological factors in the internal strengths of our country's international standardization. Other letter combinations refer to political, economic, social and technological factors in the internal weaknesses, external opportunities and external threats respectively. According to Table 2, the different combinations of the internal strengths and external opportunities for the development of our international standardization can form four kinds of strategies, namely the SO, WO, ST and WT strategies.

1) *Acting proactively: the offensive strategy (SO)*

The SO strategy requires China to actively seize various opportunities favorable for the fast development of our international standardization while seeking breakthroughs in that process and give full play to our internal strengths so as to maximize the competitive edges of our international standardization development. This is the most basic strategic choice for the international standardization development in China. In particular, our relative competitive strengths in some strategic emerging industries and traditionally competitive industries ensure that international standards reflect more on technical requirements of our country, secure the advantages of our key industries in international economic competition and further protect our national economic interests.

2) *Building strengths by utilizing opportunities: the turnaround strategy (WO)*

The WO strategy emphasizes overcoming internal weaknesses while seizing the external opportunities of the international standardization development to gain competitive advantages. At present, there exist many external opportunities conducive to the international standardization development of our country, such as the reform of standardization, the revision of standardization laws and the rapid adjustment of global industrial structures. The implementation of "the Belt and Road Initiative", the leadership of Chinese experts in international standardization organizations, the increasingly prominent strategic role of standardization, the arrival of the new technological revolution and other favorable external opportunities will, to a certain extent, make up China's weaknesses in the international standardization development.

3) *Borrowing strengths to overcome threats: the moderately offensive strategy (ST)*

The ST strategy features relatively strong internal strengths, which enable us to cope with external threats with ease. While maintaining internal advantages, we should actively seek approaches to eliminate external factors threatening the breakthrough of international standardization to obtain competitive advantages in some areas. China, by virtue of its strong economic strength and huge market space, can overcome major interruption of western countries on our international standardization to a certain degree, and coupled with external alliances, it can achieve breakthroughs in international standards of relevant fields.

4) *Conserving strengths and storing up energy: the defensive strategy (WT)*

The WT strategy needs to solve the internal weaknesses of China's international standardization development, strive to eliminate relevant external threats, conserve and gather

strengths and store up energy to lay a good foundation for seeking breakthroughs in the future. In areas where we do not have competitive advantages, we should implement the follow-the-leader strategy, according to which we should actively follow the international standardization development status of other leaders to ensure we are not too far behind our opponents. At the same time, we should strengthen technological reserves, speed up the cultivation of talents and strive to achieve the shift from being defensive to being offensive as soon as possible.

#### *B. The Selection of the Development Strategy of China's International Standardization*

The offensive, turnaround, defensive and moderately offensive strategies are suitable for different situations. But for China, the best strategy should be the first one (SO). Although we need to pay attention to internal weaknesses and external threats in strategic studies, in the face of the fast-changing international standardization situation, we can overcome negative factors more effectively only by making the most of positive factors. Therefore, combining internal strengths with external opportunities is the best development strategy to actively seek expansion and referring to the SO strategy is instructive for the international standardization development of our country.

### IV. THE STRATEGIC POSITIONING OF CHINA'S INTERNATIONAL STANDARDIZATION DEVELOPMENT

Strategic positioning is the core of organizing competitive strategies, the essence of forming which is to establish a relationship between organizations and their environment. [11] The strategic positioning of international standardization depends on the basic understanding of two questions: "Who to do?" and "What to do?" The answers to the questions involve the subjects and objectives of strategic positioning respectively, namely who are the subjects participating in international standardization activities and what are the ultimate objectives of such strategy.

#### *A. The Subject Positioning of the International Standardization Strategy*

Enterprises, societies, associations, alliances and research institutions are subjects participating in the international standardization activities of our country. Among these participants, enterprises, especially state-owned enterprises, are the most important ones of China's participation in international standardization activities. Among these participants, enterprises, especially state-owned enterprises, are the most important participants, and among state-owned enterprises, central enterprises have incomparable advantages in technology, talents and capital. The development of international standards requires huge investment. Therefore, central enterprises are participants that are most capable of carrying out international standardization. Moreover, the large number of societies, associations, alliances and research institutions are also important participants in international standardization.

#### *B. The Objective Positioning of the International Standardization Strategy*

The question of "what to do?" in the development strategy of international standardization actually includes the two aspects of "What can be done?" and "What may be done?" raised by Andrews. "What can be done?" depends on the internal conditions of our country's international standardization development, namely strengths and weaknesses, while "What may be done?" the external environment, namely opportunities and threats. The objective positioning of the strategy actually aims to realize the matching between internal conditions and external environment.

The development strategy of our country's international standardization should serve the needs of national economic and social development as well as global governance. We should lead the development of more international standards in strategic emerging industries and traditionally competitive industries, assume more leadership positions in international standardization organizations and relevant technical institutions and undertake more work of the Secretariat. Taking advantage of "the Belt and Road Initiative" strategy, we should promote Chinese standards to go global, strengthen China's voice in international standardization governance and improve the core competitiveness of the country. The strategic positioning of our international standardization can be summarized by "making key breakthroughs, decentralized participation of all stakeholders, promoting work in all areas by drawing upon the experience gained on key points and linking work at selected spots with that in entire areas".

The international standardization of our country should take inter-governmental international standard organizations as its core and encourage decentralized participation of all stakeholders in the standardization activities of all kinds of standard organizations abroad. The reason for taking inter-governmental international standard organizations as its core is mainly based on the positions and functions of ISO, IEC and ITU in the global standardization ecosystem. ISO is the world's largest and most authoritative integrated international standardization organization, whose standards enjoy the widest application in the world and have a great effect on the world's economic and trade cooperation and development. It goes without saying that taking part in the standardization work of inter-governmental international standard organizations is of great significance to enhance the influence of China's international standardization. Therefore, to participate in the work of such organizations is the orientation of the development strategy of China's international standardization. We should give full play to the advantages of the "whole-nation system" and gather strengths to assume more leadership positions in the three major international standardization organizations, undertake more work of the Secretariats, and thus gain more voice. "Decentralized participation of all stakeholders" refers to the scenario that stakeholders, including enterprises, societies, associations, research institutions and other organizations, join ASTM, IEEE, W3C, 3GPP and other foreign professional societies, associations, forums, alliances and organizations. The standards made by these foreign standard organizations play important roles in relevant fields

and have even greater influence on industries than the three major international standardization organizations.

So, the development strategy of our country's international standardization should make key breakthroughs in inter-governmental international standard organizations and encourage the decentralized participation of all stakeholders in all kinds of foreign standard organizations to form a situation where a prioritized target and decentralized participation are involved and where work in all areas is promoted by drawing upon the experience gained on key points and work at selected spots is linked with that in entire areas.

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