An Investigation on the Technical Standard Strategy for China’s Manufacturing Industry

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Abstract. China’s manufacturing industry is now the 4th largest manufacturing power in the world, second only to the US, Japan, and Germany. Large but not strong, it is still way behind developed countries. In the technical standard field, the gap between China’s manufacturing industry and industrially developed countries is showing that there is a low level of technological standards and lack of professional talent versed in technical standards. A technical standards strategy is of importance to the development of China’s manufacturing industry has been as one of the major strategies in the 10th Five-Year Plan period. The overall objective of the strategy for China’s technical standards should be capable of supporting Chinese enterprises and products in entering the international market and ensuring the superiority of China’s key industries in international competition. The implementing tactics of the strategy are all-round tracking, effective adoption, crucial participation, and strong dominance.

1. Introduction

In the general trend of global economy integration, an important obstacle to entry into the market is the technical barrier. With the increasingly reduced tariff wall in international trade, the technical barrier to trade that is formed with technical laws and rules, technical standards, and the procedure for certification, is exerting important influence and playing a decisive role. International standards are a globally used technical language and with China’s entry into WTO, the international standardization strategy is of particularly great realistic significance for the development of China’s manufacturing industry.

2. The achievements of China’s manufacturing industry

Manufacturing is one of the most fundamental activities of human beings and the cornerstone of survival and development for society through creating tremendous public wealth. The manufacturing industry is the foundation of national productivity and the pillar of the national economy.

With the reform and opening up to the outside world of China and entry into the WTO, China’s manufacturing industry is rapidly rising in the world as never before. China is now the 4th largest manufacturing power in the world, second only to the US, Japan, and Germany [1]. An important mark of China’s sudden emergence is the rapid expansion of her production capability. Its increment
accounts for 35.30% of GDP and 78.68% of all industries in 2003. The taxes paid account for about 90% of those by all industries, and the employees about 90.7% of the total of all industries. With respect to foreign trade, its exports account for 91.2% of the exports of the whole country, and the actual direct foreign investment about 70% of all actual foreign investments [2]. Over 100 kinds of products of 10 trades including household appliances, medicines, electronic devices, etc. rank the first in the world in terms of output [2]. The total trade value of export and import in mainland China has been up to US$ 1150 billion in 2004, second only to the US and Germany [3]. The legend “Made in China” and the prestige of China’s companies are gradually being recognized by the global market.

3. The status of the technical standards for China’s manufacturing industry

Despite the unprecedented development and achievements in China’s manufacturing industry since the founding of the People’s Republic of China in 1949, especially since the reform and opening up, the gap between China’s manufacturing industry and industrially developed countries is very obvious [4]. Large but not strong, China’s manufacturing industry is still way behind developed countries no matter whether in terms of the enterprise scale, technical level or the international market share, international competitiveness and the position in international division of labor [5].

In the standardization field of China’s manufacturing industry, there is a problem of low level of technical standards and lack of professional talent versed in technical standards. Problems with China’s standardization field include serious backwardness and lag in standards, serious divorce of formulation of standards from market demand, a lack of professional talent familiar with and versed in technical standards, especially ISO standards. As of the end of 2003, the average standard age of 20906 kinds of national standards was 10.12 years, the longest being 41 years, with 9608 standards exceeding 10 years, accounting for 45.96% of all national standards; the standard age of 15205 items exceeded 5 years, accounting for 72.73%. Of China’s national standards, 4826 adopted ISO standards, but 1106 of which have been updated, 316 have been cancelled while no corresponding ISO standards can be found for 460 standards, accounting for 39% of the total. These figures show that there exists considerable discrepancy between China’s standardization field and the world standard level, which has already become the bottleneck that is constraining the development of China’s economy, especially the development of China’s manufacturing industry.

4. The strategy of the technical standards for China’s manufacturing industry

Without advanced and high quality technical standards, there will be no high quality products in the true sense and no hope of success in market competition. In international standardization activities, very few international standards are set mainly by China. More often than not we merely take part in such activities as a routine or have taken no part at all. Consequently, in most cases we can only passively accept international standards.

Significant changes in the environment of technical standards and the threat to China’s economic development from the international standardization strategies of developed countries has aroused the close attention of the Chinese government. The strategy for technical standards has already been listed as one of the three major strategies in the 10th Five-Year Plan period of China.

4.1. The orientation of the China’s technical standards strategy

The strategy orientation of China’s technical standards should adapt to the national economic strategy and the strategy for science and technology as well as to the national economic strength, technological strength and the strength in international cooperation [6]. Observation of international rules should be combined with the pursuit of fairness and rationality of international rules and the superiority of products on the market with the formulation of international standards.

The international strategy for China’s technical standards can be oriented to “substantive participation”, by which we mean substantive new breakthroughs made by China in the degree of participation in international standardization activities, including the tracking and adoption of international and foreign standards, making proposals for international standards, presiding over the
drafting of international standards, and undertaking work on the secretariat of ISO, the purpose being
to make international standards mirror the requirements of Chinese technology and safeguarding
China’s economic interests.

4.2. The objectives of the China’s technical standard strategy

4.2.1. Overall objective. The overall objective of the strategy for China’s technical standards consists
of enabling China’s technical standards, through about 20 years’ unremitting efforts, to fully play a
supporting role by 2020 or thereabouts, in economic development and social progress, to be fairly
influential internationally, providing vigorous support to the strategy for making the country
prosperous by means of technical education and for sustainable development, thus increasing China’s
industrial competitiveness and meeting the needs for international and domestic trade and economic
development as much as possible.

The overall objective of the China’s standards strategy will be implemented stage by stage using
the method of “breakthrough phase by phase”, that is, gradual progress with respect to the
management system, science and technological content, market adaptation, inter-nation, as well as
people’s awareness of standards. In addition, at every stage, there will be an outstanding theme, a main
target of attack with the overall objective fulfilled by means of breakthrough by stages.

4.2.2 Objectives in different stages

(1) 2005 - 2010 (foundation stage)
- Form a system for quick tracking and study of international and foreign standards and ensuring
  unimpeded transmission of information about international and foreign standards so that enterprises
  and standardization administration departments will have something to go by when making a
decision.
- Establish an evaluation system for adoption of standards to rationally integrate Chinese standards
  with international ones. Effectively adopt international standards and advanced foreign standards;
  make new breakthroughs in undertaking work on the secretariat of ISO.

(2) 2010 – 2015 (advancing stage)
- Set up a unified and coordinated system mainly for participating in activities of international
  standardization to basically realize synchronized formulation, examination and promulgation of the
  key international standards being formulated that involve the interests of China.
- Recommend China’s superior technologies with peculiar characteristics to ISO and undertake more
  tasks of drafting international standards.
- Undertake the convening task for ISO TC/SC and work groups to exert influences on the work of
  international standards formulation.

(3) 2015 - 2020(stride across stage)
- Establish a perfect system of technical standards with international competitiveness. China’s
  technical standards will be formulated, examined, and promulgated in synchronization with
  international standards.
- The quantity of secretariats of TC/SC Technical Committee undertaken and that of international
  standards formulated with China as the chair should be way ahead of other developing countries,
  becoming an important force after Europe, the US, and Japan in formulating international standards
  and capable of promoting the development of international standards together with other countries.
- China’s technical standards should possess fairly great competitiveness in the competition among
  international standards and become one of the internationally accepted technical standards.

4.3 The implementing tactics of the China’s technical standard strategy

The tactic of implementation of the “substantive participation” strategy according to the strategy’s
overall objective and those of the stages is all-round tracking, effective adoption, crucial participation,
and strong dominance. By “all-round tracking” we mean an all-round understanding of the
international and foreign conditions and trends of standards and their strategies, and tracking and grasp
of the development of their nucleus while “effective adoption“ refers to rational integration and effective adoption of international standards and advanced foreign standards. “Crucial participation“ refers to crucial participation in the examination and discussion of the international standards involving the interests of China, striving to make international standards reflect the technical requirements of crucial fields in China. “strong dominance“ means to selectively strive for work involving China’s interests at the Technical Secretariat of ISO with China’s economic strength, technological strength, and the strength of talent, mainly striving for the responsibility for drafting international standards involving China’ interests.

4.3.1 Take an active part in organizational work of ISO and make use of and improve regulations. China will take an active part in the organizational work of ISO and learn about the regulations regarding international standards and intellectual property rights. Within the system of international regulations and order, China will replenish and utilize these regulations to protect her interests and rights. China will, through the relevant organizations, fully express her opinions to make the international regulations and order develop in the direction of relative balance.

4.3.2. Actively develop cooperative alliances of technologies and standards to enable them to break through the international monopoly. China will actively initiate cooperative alliances of different technologies and standards and encourage domestic enterprises to take part in various alliances of technologies and standards and, through the cooperation and alliance in standards and technological R&D between one nation and another and between one region and another, to establish international standards with definite independent intellectual property rights to change the state of balance of standards and actively seek breakthroughs in the standards for intellectual property rights.

4.3.3. Cultivate the national market, build the cooperation system between government and enterprises. The Chinese government will turn her home market into an integrated whole to maintain a balance between domestic market monopoly and competition. It will foster the growth of the R&D strength in the nation and build rational relationships of alliance between state and enterprises and between enterprises themselves. In the field of intellectual property rights and standards formulation, cooperation will be carried out between the government, research institutions, and enterprises and a mechanism of coordination will be established between the government and enterprises. The departments concerned will participate in the formulation of standards and, by formulating the standards for independent intellectual property rights and participating in the formulation of international standards, enhance the nuclear competitiveness and international prestige of enterprises.

4.3.4. Adjust the policy on intellectual property rights and standardization; construct the policy space for standards formulation. China will steadily review her policies on intellectual property rights, standardization, and R&D and change the irrational and unsuitable ones while promoting the coordination between them [7][8]. In the meantime, the government will promote the development of standard basic facilities by setting aside funds, training qualified people, promoting introduction and absorption of technology and innovation, and forming technical alliances between enterprises.

4.4. China will play an important role in the international standards in the future
With the development of her economy and improvement of competitiveness, China already possesses some special advantages. For example, the technical strength of Chinese enterprises has greatly increased with the march of China’s excellent manufacturing industry toward core technologies. In recent years, China’s manufacturing industry has made progress at seven-league strides, the total output having risen to the fourth in the world. China’s regional manufacturing centers of world importance have been formed around the Pearl River Delta, Changjiang River Delta and Bohai Gulf. At the same time, highly competitive manufacturing enterprises have emerged, such as Legend, Huawei and Galanz and some others. The R&D attraction of China continues to rise and she boasts the
world’s second largest R&D contingent, more doctors and graduates in science and engineering close to those of the US in number. Over 200 transnational companies including Microsoft and Intel have set up R&D centers in China one after another. China is one of the largest markets in the world, the market superiority being an important advantage in competition in the age of new standards. The enormous market is in a position to support standards users in reaching the critical capacity. The government has fairly strong control over the market. Once Chinese enterprises begin to enter into the leading ranks technologically, with the backing of government power at the crucial moment, China will be able to rise abruptly in peace.

5. Conclusions

With the increasingly reduced tariff barrier in international trade, the technical barrier including the technical laws, regulations and the technical standards, is exerting decisive influence and playing a pivotal role. In the field of new and high technology, technical standards have already become the highest form pursued by patented technologies. Standards will influence the survival of a trade, even the strength of a nation’s economic competitiveness. Without advanced and high quality technical standards, there will be no high quality products in the true sense and no hope of success in market competition.

The Chinese government has already implemented the technical standards strategy for manufacturing industry. With science and technology as the motive force, industries as the principal part, internationalization as the objective, and information as a means, superior technical standards with Chinese characteristics should be introduced to other parts of the world by follow-up adoption of international standards and advanced foreign standards so as to participate in the activities of international standardization in essence to develop an internationally linked system of technical standards, thus improving the ability of entry of Chinese products and technologies into the international market and the competitiveness and influences of China’s major products.

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References

[1] Gao Liang, The Latest Inspection of China’s Manufacturing Trade, Reform in China, Feb., 2004.
[2] Lu Wenpeng, Huang Yanyan, Thoughts on China Becoming the Center of World Manufacturing Industry, The Economist, Feb., 2003
[3] Ji Zhu, Analyse and Prospect Report of China’s economy in 2004-2005, The research center of world economy, Peking University of Industry and Commerce, 2005.2
[4] Luo Ji, Cao Jianguo, Wu Yunke, A Tentative Analysis of the Situation of China’s Advanced Manufacturing Technology and the Countermeasures, Machinery, Vol. (31), Jan., 2004.
[5] Zhang Rugen, The Challenge “Made in China” Faces after China’s WTO Entry and the Countermeasures, Technological Economy, Vol. (19), Oct., 2003.
[6] Ni Wenbin, Tian Yezhuang, Jiang Zhenhuan, A Study of Strategy for Manufacturing: Status, Problems and the Trend, Journal of Management Science,Vol.(20),Dec.,2004
[7] Richard P. Suttmeier, Yao Xiangkui, Changes in technological policies, standards, software and the essence of technological nationalism after China’s WTO entry, All-American Institute of Asia, May, 2004.
[8] Gu Xinjian, Ge Changyao, Han Yongsheng, An investigation on the strategy of China’s enterprise groups for developing integrated manufacturing, Grouping Technology and Production Modernization, Vol. (2), March, 2003.