THINKING AND PRACTICING OF NATIONAL QUALITY INFRASTRUCTURE IN CHINA

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Abstract **-**Quality has always been an important issue, and it is a hot topic in the past in all parts of the world. The globalization of the markets continues its rapid pace and as it is shaped by technological developments, more and more governments are carefully reconsidering the overall arrangement of their National Quality Infrastructure, NQI. This paper covers the concept of NQI, the relationship between NQI elements, a case of application of NQI to a food productive chain and the development prospect in China.

Keywords: *National Quality Infrastructure; NQI;food*

1. INTRODUCTION

In 2005, the United Nations Conference on Trade and Development (UNCTAD) and the World Trade Organization (WTO) issued the report Innovations in Export Strategy which for the first time put forward the concept of National Quality Infrastructure (NQI). The report believed that National Quality Base can be a quality system framework required by a country to establish and implement standards, metrology, certification & accreditation, and inspection & testing, so as to protect quality of the market products and services, meet technical requirements on manufacturers and regulators, and meet actual needs of customers. It is also known as the National Quality Infrastructure.Prior to the birth of the National Quality Infrastructure, internationally, the MSTQ (Metrology, Standardization, Testing and Quality Assurance), SQAM, SCAM and some others had been used to represent the national quality infrastructure. The proposal of the holistic concept NQI represents a new understanding of the international community that takes NQI as an organic piece to promote economic and social development.

This change not only makes NQI better understandable, but also
reflects the national quality infrastructure is a system.

In early research of NQI, it particularly emphasized the role of government in the construction of national quality and technology infrastructure, and mainly focused on its application in the public management theory. For example, scholar Racine pointed out that in a country, any construction of a high-quality infrastructure is inseparable from the government's support. Harmes-Liedtke also believed that the government plays an important role in refactoring, strengthening, upgrading and maintaining a national quality and technology base. Tippmann and Racine's research pointed out that the national quality and technology infrastructure is a public product, and national governments must play a role in this regard. Scholar Kellermann stressed that governments could provide a necessary platform for accumulation, dissemination and discussion of information on quality.

Many scholars were focused on how to build or reconstruct NQI. Bakhtiar evaluated the construction of Indonesian's NQI. Kellermann put forth a proposal to NQI reform after analyzing the NQI reform programs in Malaysia, Turkey and Vietnam, while looking at the NQI developments in Pakistan. In addition, Ukraine, Uganda and Thailand and other countries also carried out the efforts of construction or reconstruction of NQI.

On the role of NQI in promoting economic and social development, scholar Rehman pointed out in his paper Why Do Developing Countries Need Quality Infrastructure And What It Specifically Includes that in order to gain international market share, enterprises in developing countries need to implement ISO9000 at the national level. Goncalves and some others demonstrated the role of NQI in promoting trade, quality improvement, technological upgrading, security, healthcare and environmental protection.

Peuckert proved that raising the NQI level can enhance environmental protection. Araby argued that NQI is a path to national prosperity and national competitiveness. Regency demonstrated the important role of NQI for a country's sustainable economic development and international competitiveness. Scholar Moljevicfound that NQI construction had a significant impact on economic restructurings and development. Similarly, the UK government declared the UKQI on its official website, stating that NQI would help build trade trust and benefit economic transformation, especially for developing countries. For example, implementation of relevant standards in the NQI can effectively improve labor productivity, energy conservation, and promote an economy transformation to intensive development.

In this paper, the concept of NQI, the relationship between NQI elements, a case of application of NQI to a food productive chain and the development prospect in China will be discussed.

2. THE CONCEPT OF NQI

The National Quality Infrastructure, NQI, refers to a country to establish and implement the standards, metrology, accreditation, certification, inspection, testing and other quality system required, in order to protect the market products and services to meet the actual needs of technical requirements for manufacturers, regulators and customers. NQI has three characteristics: systematic, technical and basic. Three main constituents of the quality infrastructure are particularly crucial at the national and international level, namely the requirements of:

Market and consumers;
Regulatory authorities; and
International or regional agreements (e.g. the WTO Agreements).

2.1. Elements of NQI

Standards – the formal documentation containing the requirements that a product, process or service should comply with. Standards are considered essentially to be voluntary in nature. It is only once they are called up in a contract, for example, that compliance becomes a binding requirement.

Metrology – the technology or science of measurement. Metrology can be subdivided into scientific metrology (the organization and development of the highest level of measurement standards), legal metrology (the accuracy of measurements where these have an influence on the transparency of economical transactions, health and safety) and industrial metrology (the adequate functioning of measurement instruments used in industry, production and testing).

Accreditation – the activity of providing independent attestation as to the competency of an individual or organization to provide specified services (e.g. testing, certification).

Certification – the formal substantiation that a product, service, organization or individual meets the requirements of a standard.

Testing – the determination of product characteristics against the requirements of the standard.

These elements are all interrelated and to some extent all are required to provide the purchaser, user or authorities with the appropriate confidence that the product, process or service meets expectations.

1.2. NQI organizations

The organizations that make up a quality infrastructure can be public or private organizations.

Standards are usually developed and published under the auspices of a national standards body (NSB). At the international level, a vast number

of bodies (including ISO, IEC, CAC and ITU) deal with standards in a variety of sectors. Various types of memberships in these international standards bodies are available to NSBs. Usually only full membership entitles the NSB to participate fully in standards development activities.

A national metrology institute (NMI) is responsible for ensuring that national measurement standards are maintained at certain accuracy levels, traceable to international standards, and address the needs of industry and the authorities of the country in question. The NMI is also responsible for ensuring that the national measurement standards are appropriately diffused into industry. NMIs are usually government or semi-government organizations. The major international

metrologyorganizations are BIPM (scientific metrology) and

OIML (legal metrology). CGPM and BIPM together ensure that an international, harmonized measurement system (the International System of Units – SI) is in place; without this system none of the other standardization or scientific activities and trade can take place.

Accreditation organizations are driven by the need to provide independent evidence that conformity assessment service providers are technically competent. accreditation bodies are invariably government organizations in order to ensure that they have the appropriate status to be used by both the public and the private domain. The government should ensure that only one such body operates within a country as accreditation is seen as a non-competitive activity. At the international level, two organizations, IAF and ILAC, provide mechanisms for the peer evaluation and international recognition of accreditation organizations.

Certification bodies provide an independent attestation that a product, a process or a service complies with relevant standards. This has become mainly a commercial activity.

Test laboratories need to provide independent evidence of their technical competence. This can be achieved by accreditation.

1.3. Benefits of NQI

A national quality infrastructure helps to bring about improvements in health care and a more equal distribution of national wealth. The many benefits of NQI are detailed below:

1)It helps to overcome challenges from free trade and globalization. NQI is essential to breaking down technical barriers to trade by harmonizing import and market access requirements. 2) It enables access to international markets and preserves domestic markets. 3) It promotes innovation and competitiveness. 4) It assists regulators and service providers. Regulators are to ensure technical regulations exist and are properly enforced, particularly in areas related to the well-being of the population such as health, safety and the environment.

3. NQI OF CHINA'S FOOD

NQI gradually been recognized as "pillars" to support the sustainable development world widely and to establish equal and fair-trade relationship internationally in the future. Chinese government is taking food safety as a serious issue, and has already come out a comprehensive food safety strategy to restore people's belief in the safety of their food "from the farm to the Consumer's table". As part of NQI of China, food of NQI is implemented.

The administrative procedures require that a regulator be identified, i.e. the agency that will implement the technical regulation at national level, and institute sanctions should it be required. In China, the authoritative departments are:

Ministry of Health People's Republic of China; Ministry of Agriculture of the People's Republic of China; State food and drug administration; State administration for industry & commerce.

The regulatory system includes: Law of food safety; administrative rulings and decisions; General enforcement regulations; Branch Rules and guides.

As China's national metrology institute, National Institute of Metrology (NIM) has been playing a great role in the process of developing National System of Metrology in Chemistry.

As one of the main parts in metrology, chemical metrology aims to obtain the measurement results with the characteristics of accuracy, reliability and comparability, which are the basis for mutual acceptance for analytical results. The achievements of NIM for food analysis in the following aspects. 1) Developing food methodology; 2) Developing purity, food-matrix CRMs; 3) Participating in international comparisons studies and claiming relevant CMCs in food arena;4) Organizing proficiency test schemes. or food analysis, we have developed more than 30 food-matrix CRMs, such as milk powder,Chinese herbal medicine, feed, seafood, package materials, etc. The properties of CRMs are focused on toxic/harmful elements and elemental speciations, food additives, pesticide residue, veterinary drugs, and nutritional components. More than 200 kinds of mono/multi-element solution CRMs and high purity compound CRMs are available for the purpose of calibrating analytical instruments and using as working standards.

China has more than 2,000 national standards for food, food additives, food-related products, more than 2,900 industrial standards, and more than 200 local standards.

Let us look at a milk powder production chain and to the application of the NQI to this production chain. We call this a "farm to fork" system.

There may be several ministries involved in controls for the milk powder industry. Regulations complied with by the farmer may consider aspects such as: allowable levels of additives; allowable levels of Antibiotics for dairy cattle. The milk powder must also comply with the requirements of the country:

- product standards,
- hygiene and operational requirements,
- specific analysis to demonstrate conformity,
- prescribed methods for microbiological, chemical or physical examination of the products by reference to appropriate standards.

The farm may also be required to submit to a HACCP audit.

During processing, standards to be applied may address, and also needs extensive testing and measurements.

The value chain approach for a food product is helpful in analyzing and evaluating the services provided by the NQI. For every step from the raw material to the final product – farm to fork – this approach includes the detailed analysis of requirements on standards, metrology, testing laboratories, calibration, reference materials, certification bodies, accreditation, etc, and which of these are covered by the NQI, the role of international cooperation, and the necessary coordination.

4. CONCLUSIONS

With the rapid growth of globalization food trade, the issue of food challenge of the development of food arena, the implement of food NQI should possess foresight and impendency.

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REFERENCES

[1] ITC, Standards and Quality Management, ROAD MAP FOR QUALITY,2004

[2] Clemens Sanetra, Rocío M. Marbán, THE ANSWER TO THE GLOBAL QUALITY CHALLENGE:A NATIONAL QUALITY INFRASTRUCTURE,2007

[3] ITC, Executive Forum , Innovations in Export Strategy A strategic approach to the quality assurance challenge,2005.