Part III: Master Plan

(Recommendation and Evaluation of Master Plan for Industrial Standardization, Metrology, Testing and Quality Control)

Chapter 1 defines the strategic thrusts, which the master plan is target for, on the basis of analysis of major issues related to industrial development as the first step for formulating the master plan. Chapter 2 summarizes the situation of industrial standardization and quality management performed by the industrial subsectors under study to identify the tasks to be focused. Chapter 3 evaluates the existing system for promotion of standardization and quality management in view of the strategic thrusts thus set, and recommends direction for improvement and strengthening the system. Chapter 4 recommends projects for the tasks to be undertaken under the coordination among more than one organizations within a definite period of time. Chapter 5 recommends the implementation plan for the above master plan.

Chapter 6 concludes the study results and recommendations on the master plan.

1 Strategic Thrusts of the Master Plan

Figures 1-1 and 1-2 outline the process of planning the master plan. Chapter 1 defines strategic thrusts in the areas of standardization, metrology, and quality control in connection with the issues identified in the area of industrial development (Figure 1-3).

1.1 Summary of Issues in Industrial Development[1]

(1) Fundamental issues facing industrial development in Viet Nam

Many issues related to industrial development in Viet Nam have been essentially the same as those observed in the development process in the original ASEAN member countries, which achieved significant growth by using industrialization as a major engine since the late 1980s, and some of the issues still remain unsolved. For the purpose of this study, they are referred to as fundamental issues, which are summarized as follows:

1) Shortage of available development funds
2) Undeveloped industrial infrastructure
3) Lack of technology and management know-how
4) Insufficient ability to explore new markets

(2) Constraints peculiar to Viet Nam

In addition to these fundamental issues commonly seen in many developing countries, Viet Nam faces various issues which stem from its ongoing transition from a centrally planning economy to an economy under market mechanism. These issues are summarily manifested as "the lack of knowledge and experience in management under conditions of the market mechanism functioning."

(3) Issues newly raised in the course of progress of industrial development

To address the fundamental issues, the Vietnamese government pursues basic strategy focussed on encouragement of direct foreign investment, thereby to use foreign capital as a major source of funds, technology, management skills and markets. As market opening is a prerequisite for promotion of foreign investment, the country has adopted policies leading in that direction.

In the efforts to attract foreign investment and promote opening of the economy, however, several issues have surfaced recently.

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[1] For detail, see Chapter 1 of Part II.

First of all, progress in industrialization is relys on imported materials and parts, so that the intra- and inter-industrial linkage in the country is decreasing. The development of many joint ventures formed in the manufacturing sector has not advanced beyond the assembly stage, and rely on imports for parts and components. State enterprises, which sell their products mainly to the domestic market, also depend much on imported materials.

Secondly, as the country opens up its economy, its industrialization process is increasingly directly impacted by ASEAN member countries where industrialization has reached at a more advanced level. In particular, large quantities of goods are flowing into the country as a result of the opening of the economy, and exert pressure on domestic enterprises, led by state enterprises, which are losing competitiveness due to the slow pace of improvement in management efficiency.

As a result, the need for industrial transformation and strengthening is recognized as a major challenge, requiring a shift of the focal point of policy from the assembly industry to support industries, and a shift from contract processing to direct export.

It is important that the new challenge should not be taken only as a negative impact of economic opening. Rather it should be viewed as an opportunity to take advantage of the open economy and use it as an impetus for economic development, thereby to better meet the evolving challenges to be encountered in the internationalization process, e.g., implementation of AFTA.

1.2 Strategic Thrusts

The major challenges required for industrial development can be classified into the following three groups:

1) Development of industrial strength capable of sustaining growth under the new economic system
2) Evading of the adverse impact on the domestic economies created by transition to the open economy
3) Economic development capitalizing on the open economy

The study focuses on how standardization, inspection, and quality control ("standardization and related initiatives") will be able to contribute to achieving these targets.

The development of industrial strength as the first step requires individual enterprises (or the industry as a whole) to make progress in the following areas:

1) Acquisition of industrial technologies specific to each industrial area, with modernization of facilities and equipment
2) Acquisition of management technology for use in manufacturing
3) Acquisition of marketing and management know-how
4) Fostering of research and development capabilities

The standardization and related initiatives will be able to help address these issues by providing better industrial management technology which forms the basis for strengthening industrial competitiveness, e.g., more efficient consumption of raw materials by means of standardization within the company, work streamlining, and reduction of the rejection rates through proper quality control. Also, they help in the learning of management know-how.

The adverse impact on the domestic economy caused by the opening of the economy is, in the short run, manifested as increased pressure on domestic enterprises by (1) products which are illegally imported without paying import duties and sold at low prices, and (2) low-priced but low-quality products which are legally imported. These effects are multiplied by the lack of international competitiveness of the domestic enterprises. The standardization and related initiatives will help prevent market distribution of substandard products which are detrimental to consumer safety, labor safety, and environmental preservation. It will contribute to support for domestic enterprises by helping to assure there is fair competition with imported products having acceptable quality.

Further, in the area of industrial development under conditions of an open economy, the standardization and related initiatives will contribute to the anticipated use of CEPT by Vietnamese industries and expansion of export markets by means of ASEAN industrial cooperation projects by: (1) forming the technological infrastructure of testing and inspection service, thereby to provide reliable certification for domestic enterprises seeking to sell in export markets, and (2) contributing to the strengthening of industry to enable competition in the free competition market, through dissemination of standardization and quality control.

Against the background of these important issues, the strategic thrusts of the master plan, in view of contribution by the standardization and related initiatives, can be defined as follows:

1) Promotion of in-company standardization and dissemination of the new concept of quality management, conducive to the fundamental strengthening of industry which can function in the context of the new economic mechanism.
2) Enhancement of the system to promote standardization and related initiatives, contributory to both formation of technological infrastructure, which will help ease the adverse impact on domestic economies created by the open economy, and to industrial development that makes full use of the open economy system.

1.3 Projected Index Numbers of Economic and Industrial Development

Table 1-1 gives a statistical perspective of economic and industrial development which will be used in projection of scale and estimation of economic effects of the projects proposed in the forthcoming sections. Statistics are not developed well in Viet Nam, increasing the difficulty of making projections for long-term quantitative planning.

The projection is based on the "Orientations and Tasks of the 1996-2000 Five-year Plan for Socio-economic Development" adopted at the VIIIth National Congress of CPV. The figures given by the plan are more aggressive than the targets set at the past national congress of CPV and the Central Committee Plenary sessions. These may be also higher than those which can be obtained through extrapolation of the past trend. Nevertheless, economic and industrial development in Viet Nam while it is still in a phase of approach run for full-scale development, is expected to make an increasingly significant achievement in the future. Therefore, the index numbers thus projected on the basis of the long-term development target are not necessarily feasible in this context. As the quantitative target of the system development, these figures with ambitious biases, will be appropriate in view of contribution to the industrial development.

In evaluating projects, however, these figures might lead to optimistic conclusions resulting in excessive investment, unless the above possible biases in the projections are taken into consideration.

Table 1-1: Projected Economic Indices

	Unit	1995 (actual)	2000	2005	2010	Assumed annual growth rate (%)	Average growth rate (%) 1991 - 1995
GDP (*1)	Bill. Dongs	43,797	68,900	108,500	170,900	9.5	8.8
Industrial sector	Bill. Dongs	9,976	19,200	37,000	71,200	14	13.4
Gross output (*2)							
Industrial sector	Bill. Dongs	26,463	53,200	107,100	215,300	15	14.4
Equipment & machinery	Bill. Dongs	973	1,900	3,800	7,400	14.5	13.4
Electric & electronic	Bill. Dongs	514	1,200	2,600	5,800	17.5	16.7
Number of enterprises (*3)							
Industrial sector	Number	2,002	2,600	3,300	4,200	5	-6.3
Equipment & machinery	Number	254	300	400	500	4.8	-8.2
Electric & electronic	Number	59	100	100	100	5.8	-0.4
Population	'000 persons	73,959	80,900	88,400	96,700	1.8	2.2

Notes: *1) At 1989 constant prices
*2) State enterprises only
*3) Assumed 1/3 of the annual growth rate expected for the gross output, presuming that the restructure of enterprises are already completed.

Figure 1-1 Outline of Planning Process

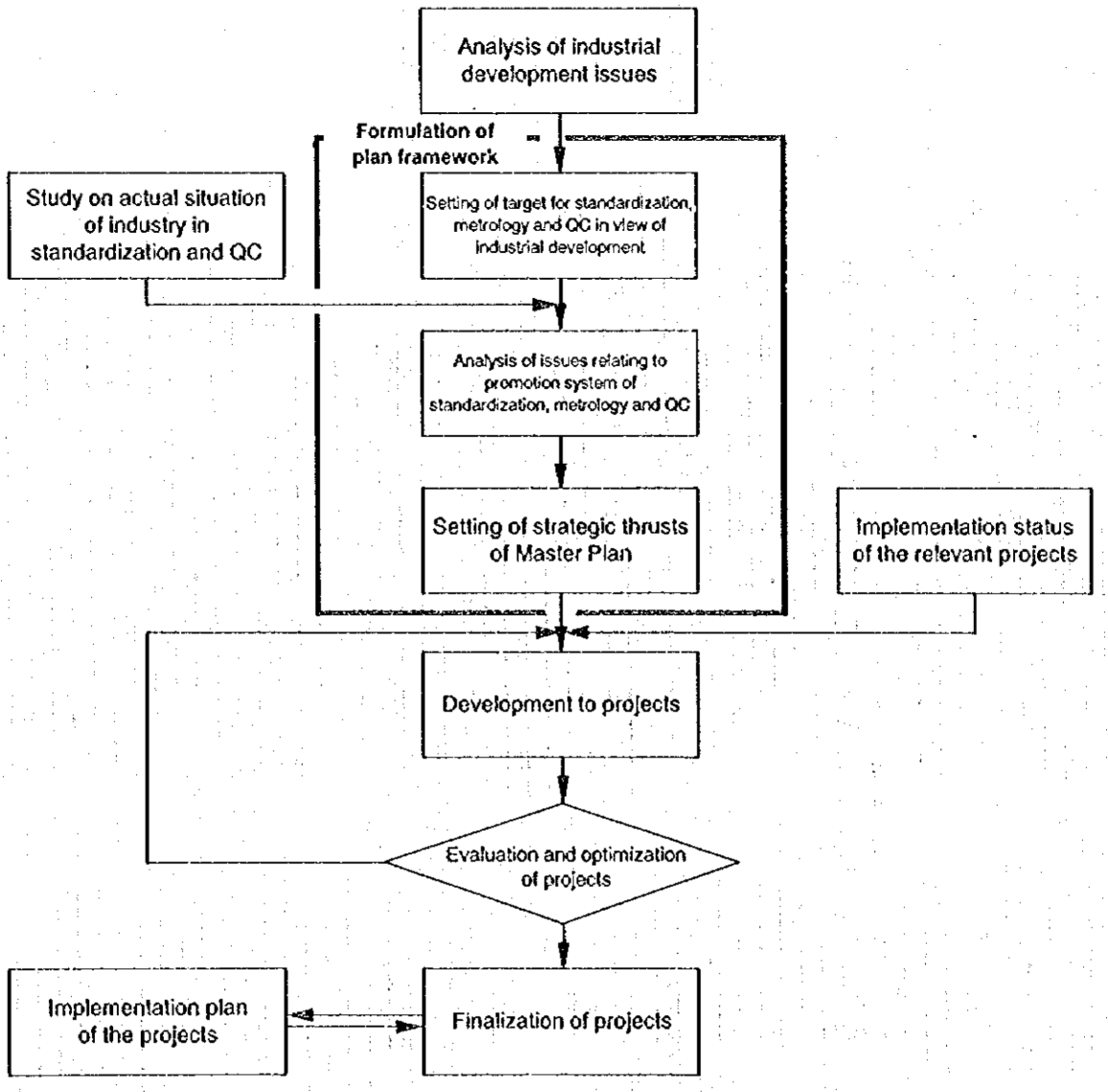


Figure 1-2 Setting of Plan Target, and Development to Project

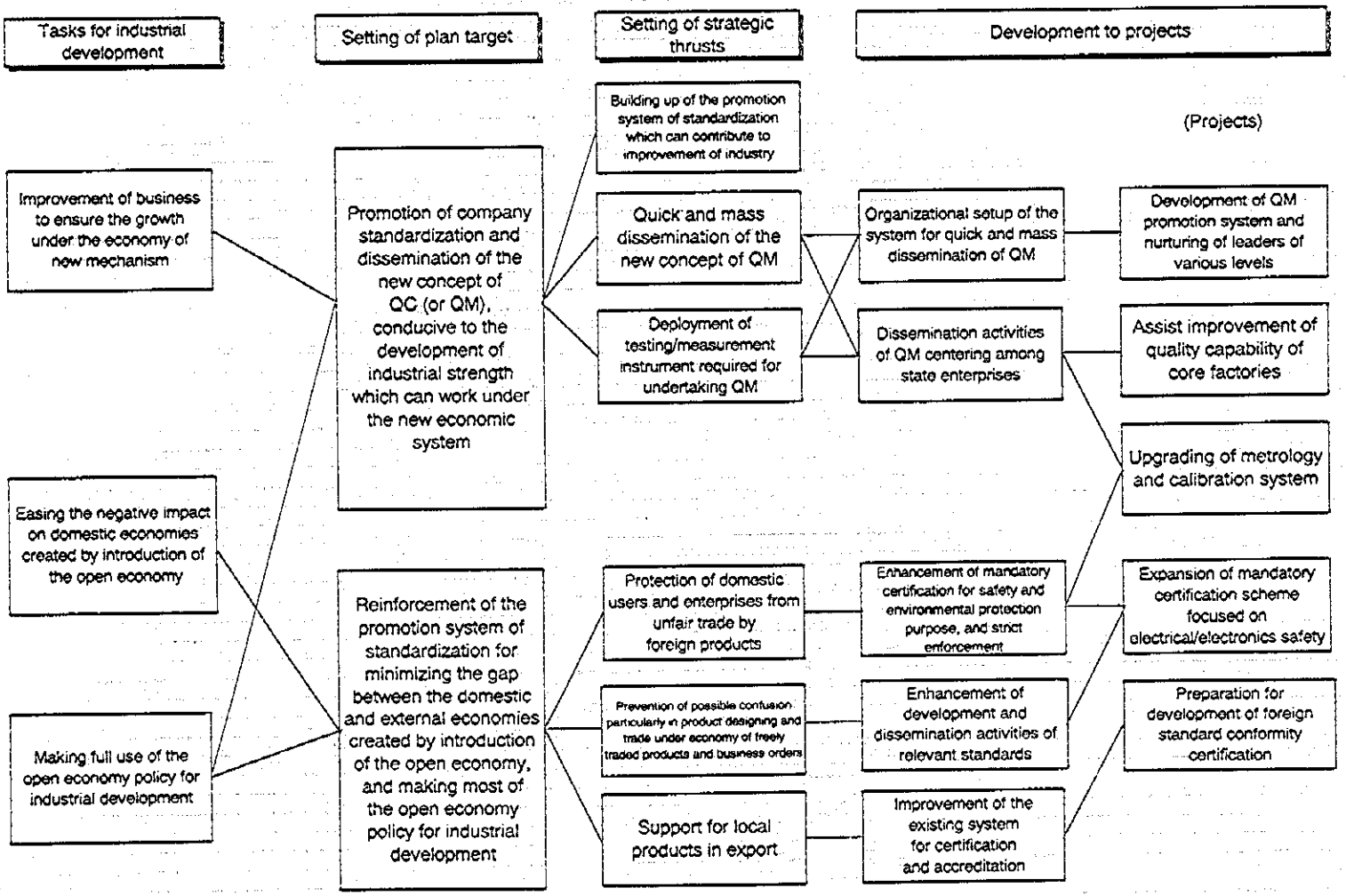
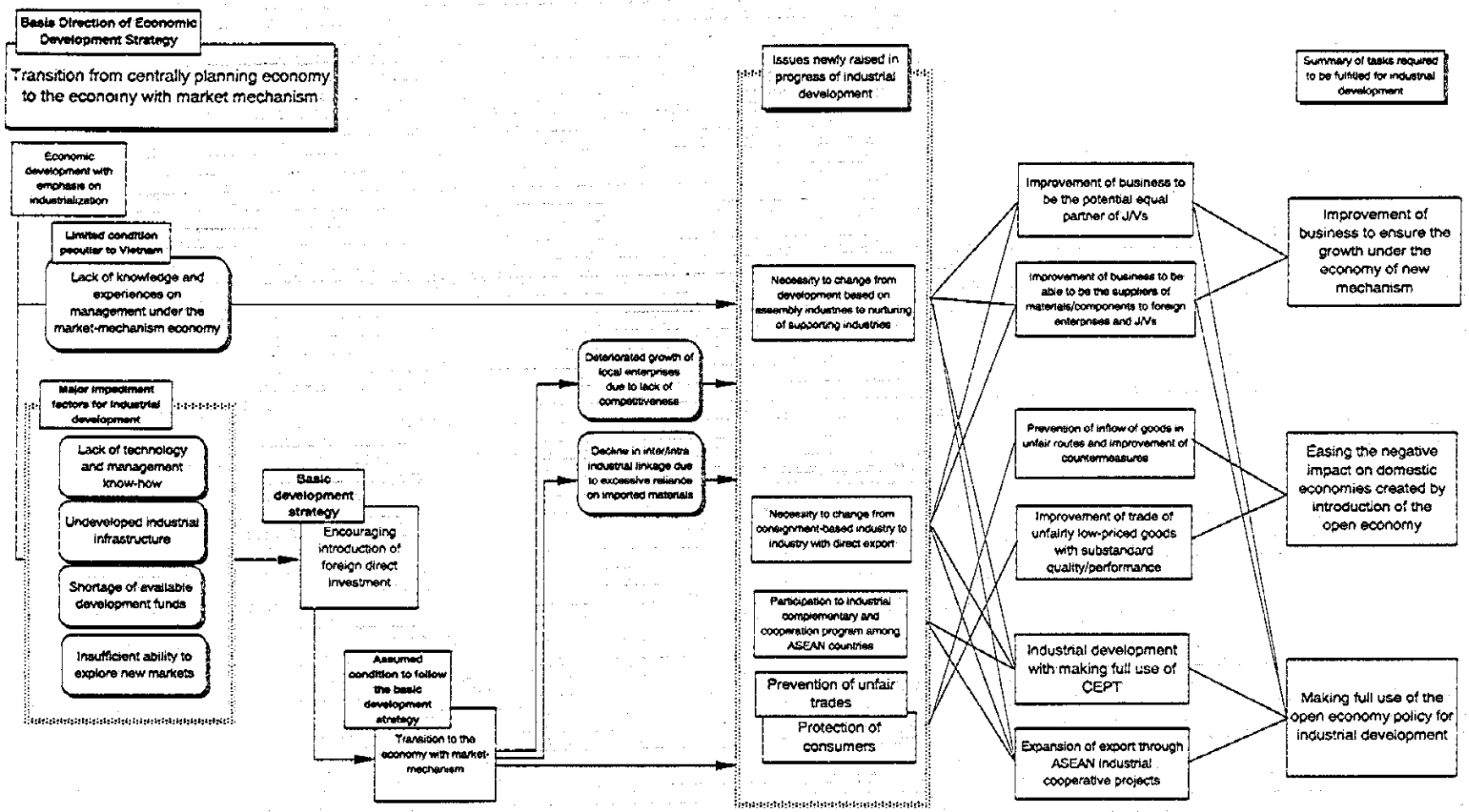


Figure 1-3 Tasks for industrial development



2 Industrial Standardization and Quality Management in the Subsectors under Study

The performance of industrial standardization and quality management in the subsectors under study is as follows (for details, see Part IV):

(1) Standardization

1) Manufacturers generally meet certain quality standards declared in advance by themselves for their products, in compliance with the existing quality registration requirement. The TCVN is mostly used as the standard for this. The manufacturers have established company standards also, if necessary. The larger-scale manufacturers have often requested their material suppliers to use TCVN as a standard to be satisfied.

2) The standards, however, are regarded as nothing but statements of requirements for satisfying quality regulation as required by the quality registration scheme. The standards are not used for rationalizing production activities by standardizing their working procedures, etc.

3) International or foreign standards, instead of TCVN, are being increasingly used among J/V and the manufacturers targeting export markets.

4) Manufacturers find difficulty in obtaining updated information related to technology.

(2) Quality management

1) Manufacturers are strongly conscious about quality of their products, but their quality management is limited to quality inspection. High rejection rates of finished products and high rates of products returned to processing are left without remedial measures, resulting in deteriorating production efficiency and reducing their competitiveness.

2) Almost no resource is available in industry at present for implementing quality management with understanding the concept of quality management exactly.

3) Technicians in industry have high potential of skills, and dissemination of quality management will be highly possible, so long as the concept of quality management is disseminated successfully, and the top and middle management of manufacturers are well trained about the organizing method of quality management.

(3) Testing facility and equipment required for quality management

1) Only few manufacturers own their testing facility and equipment required for undertaking quality management. Most manufacturers do not have testing equipment that meets minimum requirements, except for the larger-scale manufacturers.

2) The calibration of measuring instruments of manufacturers, particularly in the case of J/Vs, is undertaken abroad mostly.

(4) Other matters relevant to quality and industrial development

1) Improvement of product design has not been carried out for many years, especially in the case of the state-owned companies. Their production facilities in general are also obsolete.

2) The operation rates of production facilities are significantly low, due to the severe competition with illegally imports (that enter without payment of import duty), imported products, second-hand imported products, and low-priced but low-quality imported products, etc.

3) Manufacturers intent on producing quality products procure materials from overseas, resulting in shrinkage of the domestic market due to a consequent decrease in inter- and intra- industrial linkage.

3 Evaluation of Current System of Industrial Standardization, Metrology, Testing, and Quality Management, and Recommendation on its Improvement and Development

The following evaluates the current system of SMTQ in Viet Nam in view of attaining the target set in Chapter 1, and on the basis of the features described in Chapter 2, pointing out how it should be improved and strengthened in specific areas of activity, while taking into account the international trends related to the issues identified. Further, improvement and development measures as well as action plans when applicable, are recommended for adoption in Viet Nam, with due consideration given to the situation specific to this country.

3.1 Public Administration System Related to Standardization and Quality, and Organizational Setup

Government agencies and public organizations responsible for standardization and quality control in general are defined in the Act on Product Quality which is the fundamental law covering the following areas:

1) State administration agencies
   a) MOSTE (STAMEQ is the directly responsible directorate)
   b) Regional Center for Standardization, Metrology and Quality Control (QUATESTs is the responsible organization)
   c) Provincial Departments for Standardization, Metrology and Quality Control (SMQ offices in 61 provinces and designated cities)
2) Quality management organizations of various ministries and organizations (i.e., Department of Science, Technology and Environment (DOSTE) of each ministry)

STAMEQ serves as the core organization and its duties are roughly classified into five areas: (1) standardization, certification, and accreditation, (2) metrology and testing, (3) testing and inspection, (4) quality management, and (5) registration, inspection and control of product quality (quality control). In addition, it conducts promotional and training activities to support the above services.

The public administration system in the fields of standardization and quality control (covering the above (1) and (5)) consists of three subsystems of establishment and enforcement of national standards (TCVN), namely certification, quality registration, and state inspection. Quality registration requires manufacturers to be responsible for quality

of their products according to the standards they are obliged to comply with. State inspection is designed to ensure enforcement of laws and regulations related to quality registration and certification, clearly distinguished from the other two. In addition, state inspection procedures include export and import inspection which is close to mandatory certification in a broad sense.

(1) Major issues identified

To promote standardization and quality control, it is imperative to develop a system which can reflect not only the intent of the government, and that of industries.

The "quality registration system" has been playing a leading role in public administration in the areas of standardization and quality control. Clearly, it has accomplished beneficial results in raising quality awareness by encouraging individual enterprises to be responsible for the quality of their products. Also, by using standards as the basis for quality assurance, the TCVN/TCN/TC system of standards has become widely used by private enterprises, producing tangible results in promotion of standardization activity.

Nevertheless, the system is characterized by a top-down approach; standardization and quality control activities are initiated by the government. The approach was justifiable at one time, when enterprises under the old system were state owned and their policies and actions necessarily directly reflected the decisions of the government.

Under the new economic system, however, management policy of individual enterprises (although state enterprises are expected to play a central role for the time being) is established and implemented by each enterprise, which in principle is autonomous. Yet, they are not organized in the form of trade association, and thus there is no communication channel between enterprises. Particularly in want is a channel whereby the plans and activities of joint ventures, which are expected to serve as technology leaders and adopters in the country, can be more widely known. It is increasingly imperative to develop a system which can reflect the intent of industries.

(2) Discussion

1) Government role in standardization

Government-led standardization activity generally assumes the following roles: (1) to conduct activities related to the establishment of standards and certification, which cannot be carried out by private sector, (2) to promote private sector's standardization activities, and (3) to participate in and contribute to international standardization activity. In other words, the private sector is responsible for basic standardization activities, whereas government is expected to be active in the areas which have

significant social impact, require high levels of reliability, require public participation where the private sector alone cannot make much progress, when there is a risk of unfair practice under free competition, and where coordination by neutral organizations is required.

Generally, standardization represents efforts to build consensus among related parties in order to reduce, simplify and systematize things or matters which tend to diversify, grow complex and disorderly without proper control. Originally, it was promoted through the establishment of standards, then certification was added as an effective means of promotion. In the process, in many countries it expanded its scope from activities by related parties to those led by government as it was proven that standardization can be effectively promoted with participation or leadership of government, while industry constitutes the basis for actual activity.

In Viet Nam, the "private sector" needs to be interpreted as a combination of state enterprises and their joint ventures, consumers, and universities. As the country has shifted to the new economic system, and business management is moving from the previous, government-led, centrally planned mode, closer to individual decision-making, although state enterprises dominate the major part of business activities. Joint ventures are managed by taking into account the intent of foreign partners. In future, standardization activities should be made capable of reflecting opinions and views of industries, consumers, the academic world and other related parties.

2) Emerging issues related to public administration for standardization

Up until recently, standardization activity in the country has focused on the development of standards as the basis for production activity, and on the use of various schemes to regulate production and distribution activities (e.g., quality registration, export and import inspection, and mandatory certification). Transition to the new economic system based on the market mechanism and openness to the outside world, however, creates new issues which must be properly addressed by public administration in the areas of standardization and quality control (see Chapter I also).

To cope with these issues properly and effectively, firstly a system to promote standardization must be developed in such a way that it reflects the opinions and views of industries, universities and other related parties, as pointed out earlier. Success in this enables profound understanding of the issues that are to be tackled, and implementation of concerted activities, by all the parties including government organizations and industries. Secondly, market opening further intensifies the need for participation in international standardization activity, and more and more items can

efficiently be dealt with by joint efforts, rather than by the country alone. It increasingly requires activities within the framework of international cooperation.

(3) Recommendations for Viet Nam

1) Review of basic concept of standardization, and establishment of a public forum to reflect opinions of industries, consumers, and universities in standardization and quality control promotion activities

The basic framework for standardization and quality control activities must be shifted from a government-led and public administrative perspective to the viewpoint of building the technical foundation for industrial and economic development. In this context, the major targets of activities should include (1) participation of industry and enterprises in the national standardization and quality activities, and (2) promotion of standardization activities in industry and in enterprises. To ensure that the strategic direction for standardization is set so as to reflect the needs of the industries, it is recommended to create a standardization advisory committee which is has broad-based membership representing the industries, consumers, and academe. The committee will make recommendations on STAMEQ's basic policymaking and planning. For the time being, STAMEQ will continue to retain its position and role as the principal organization in these areas, and as such it will pursue the above concept through forming the committee.

However, for industry to be able to take leadership in standardization activities, becoming aware of the needs for the activities, further development of industry is required in keeping with the evolution of industrial technology particularly of product development and improvement.

When industry can assume leadership in standardization activity, STAMEQ's role should be shifted to that of a supporting organization having expertise and experience in standardization activity, at which time the committee should be converted into an advisory council.

The council will hold general conferences to conduct overall discussions and make decisions, and subcommittee meeting for discussing basic policy for various fields[1].

The required action for the above is as follows:

a) Legal and regulatory aspects

1. The basic direction of standardization and quality described above should be

[1] For example, subcommittees for ISO, IEC, certification and accreditation, general machinery, automobile, electrical and electronics, etc.

incorporated into the Act on Product Quality. In other words, as the major objectives of the competent government agency for standardization should include, (1) participation of industry and enterprises in the national standardization and quality activities, and (2) promotion of standardization activities at industry and enterprises are incorporated.

2. Provide for establishment of a Standardization Advisory Committee within a certain period

b) System and operational procedures

Involvement of industries, consumers, and academe in standardization activities should be promoted

1. Immediate action: Promotion of involvement of industries, consumers, and academe in standardization and quality management promotion activities. Encouragement of their participation in the international conferences related to standardization and quality management.
2. Short/mid-term activities: Establish a Standardization Committee as an advisory organ to the Director General of STAMEQ, with sub-committees which handle specific technical fields. The Committee discusses and gives advice to the Director General on the direction of standardization when requested by the Director General. The role and status of STAMEQ as the policy planning, implementation and national representative agency remains unchanged, while it will take into account for its own organizational development the advice given by the committee for basic policy (annual and two-years action plan, etc., for example).
3. Mid/long-term activities: Change the advisory committee into an Advisory Council, and make the council the central organ for establishing basic standardization policy direction, and the national representative for international standardization activities, while the STAMEQ acts as an administrative agency responsible for development of the policy direction into specific activities and implementation of them.

2) Promotion of regional cooperation in standardization and quality control initiatives

There are a number of areas related to certification and accreditation required for promotion of standardization and quality control, testing and inspection, metrology and calibration, and human resource development, which can be jointly developed, say with ASEAN countries, to enjoy benefits from scale of economy and resource sharing. These areas should be clearly identified and opportunities for regional cooperation

should be pursued (see the section covering each item for detail).

3.2 Development and Dissemination of Standards

(1) Major issues identified

In Viet Nam, standards have been widely used as the basis for product quality under the quality registration system, besides their originally designated role as a technological basis for design, production, procurement, and testing of equipment, components, and materials. Within this framework, TCVN as national standards, TCN equivalent to industrial standards, and TC characterized as company standards have been developed and used in a systematic way and with a certain division of responsibilities. In the standards development process, representatives of General corporations or upper organizations participate as those of related industries.

As the open economy has catalyzed business activities, particularly those of joint ventures, which aggressively introduce new technologies, the traditional TCVN-based standards development and dissemination process is facing the following problems:

1) Corporations are only able to represent increasingly small portions of industries and their opinions, while no trade association has emerged to better reflect voices of the increasingly diverse body of industry, including joint ventures. As a result, it is becoming increasingly difficult to reflect the needs of related industries in the standards development process. In fact, standards established recently are primarily based on public needs, such as those related to safety and those embodying environmental regulations, while few originate in actual industrial needs.
2) TCVN, which has been primarily developed on the basis of GOST and COMECON standards, is now converting its base to international standards or widely used foreign standards. Nevertheless, the conversion process is rather slow as there are not always international or foreign standards equivalent to TCVN, or direct conversion is not always acceptable. On the other hand, TCVN is losing its popularity among manufacturers, particularly joint ventures and those making export production, who increasingly use ISO, IEC, ASTM, and other foreign standards, as the case may be.

(2) Discussion

1) Direction of national standards development

Naturally, the strategic direction of national standards development varies among countries, and it should be decided through extensive discussions by using a variety of means such as the council proposed above. Judging from the result of the field study,

there is a strong need for standards development in the following areas[2]:

a) Development of standards which contribute to prevent confusion in trade and product design
b) Review of GOST- and COMECON-based standards to ensure consistency with international standards
c) Modification of TCVN in cases when the adaptation and harmonization of TCVN to international standards would not match local technology levels
d) Standards required for expansion and reinforcement of mandatory product certification
e) Basic standards required for promotion of quality control

The number of standards developed should not be overemphasized. Rather, the development process should be made to proceed from the viewpoint of how it can contribute to promotion of standardization, with prioritizing of the needs of standards development, taking into account the social and economic conditions of the country. When new technologies and products flow into the country at a rapid rate, it is inevitable that international and foreign standards are increasingly used.

Major roles of industrial standards are categorized as follows:

a) Promotion of mutual understanding between countries - Nomenclature, symbols, graphics, units of measurement, and test and evaluation methods, etc.
b) Securing of compatibility and consistent interface - Bolts and nuts, compatibility in information and FA fields, and interoperability
c) Coordination of diversity - Mass production through the use of basic materials and common parts and components, and optimization of the number of products offered
d) Clear definition of adequate product quality - Establishment of quality standards
e) Others
   1. Accomplishment of policy objectives - Rationalization of production, simplification and fairness of trade, and consumer protection
   2. Removal of trade barriers - Preparation and integration of international standards

At the same time, noteworthy recent trends are the establishment of "partial standards" which incorporate portions of product standards that are urgently required, and standardization of systems and processes rather than products, such as ISO 9000 and ISO 14000 Series. These movements are useful to monitor for future development

[2] The present study primarily covers machinery, metalworking, and electrical and electronic subsectors, with secondary focus on textile and apparel, construction materials, and petroleum products.

of standards in Viet Nam.

2) Mandatory standards

The implementation of mandatory standards is incomplete at present. This incompleteness makes people lose confidence in the mandatory standards.

In Viet Nam, mandatory standards are established mainly in the areas of safety, public health, and the environment. Products required to comply with mandatory standards must receive product certification. Without the certificate, the products are not allowed to be sold in the market, but in actuality, they are being sold without the certificate. The mandatory certificate requirement is not been complied with completely[3]. Standards are expected to be effective when followed by people as norms, even if these are established as voluntary ones. Mandatory standards, however, are established to force the people to follow. Therefore, if the compulsory implementation is incomplete, the people will lose the confidence they have in the system of mandatory standards.

In recent years, as a worldwide trend, standards have been established as voluntary standards. If mandatory standards are needed for regulatory purposes, a special law or regulation is effectuated, making reference to related standards as far as possible. This way, establishment of standards as voluntary ones has the advantage in the following:

a) The difficult process required for mandatory standard development can be avoided, so that technological advancement is easily reflected in standards, and

b) Measures are taken by the competent authorities specialized in the field, in case of violation. It is in practice difficult for the agency responsible for standardization (STAMEQ in the case of Viet Nam) to take all the necessary measures in every field covered by standards.

3) Dissemination of standards

Dissemination of standards is one of the important activities in standardization promotion. The activity is essential for successful promotion of standardization.

Dissemination activities can be categorized into two. The first comprises activities that actually promote standardization, through which the use of standards in general is encouraged. Activities in this category include general educational and promotional activities, and promotion of the certification system. Also, in addition to national

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[3] However, the actual confusion caused by this situation seems not to be serious, since most of mandatory standards of TCVN are related to labor safety, environment, public health, and units, etc., and only few of them are that of product standards.

standards, organization standards adopted by trade associations and academic societies, and company standards used by individual enterprises, play major roles in the standardization process. Thus, activities to encourage these organization standards and company standards are also important.

Another activity of dissemination is to promote specific standards and their content. Essentially, this involves the encouragement of standardization in a certain area by promoting specifications contained in the applicable standards, and the improvement of communication by integrating and fully utilizing test methods, languages and terms, and drawing symbols. Such activities often go beyond the traditional role of promoting standards, and contribute greatly to technological improvement.

(3) Recommendation for the case in Viet Nam

1) Establishment of standards as voluntary standards

It is recommended to establish all the standards as voluntary ones for two reasons. First of all, it will help regain reliability of present standards and certification, which has been lost due to insufficient enforcement of mandatory standards. Secondly, it will help develop standards as the true technical foundation for industries. To make mandatory elements in standards legally enforceable requirements, various measures are feasible, including: (1) to incorporate standards, by reference to them, into applicable laws and regulations setting mandatory requirements, or (2) to set forth mandatory requirements as the basis of the mandatory certification system.

Reviewing works on law and regulatory aspects, will be required particularly about laws regulating mandatory certificate, import and export inspection, and the matters mandatory implemented by the standards.

2) Review of TCVN standards using GOST/COMECON as the technical base

GOST is still used by some parties, particularly those active in the local market. Nevertheless, major sources of foreign investment, and raw materials (increasingly procured from outside sources as a result of market opening), as well as export destinations for products of joint ventures, are Western Europe, the U.S., Japan, and East and Southeast Asia, so that diverse standards are used accordingly, including ISO/IEC, ASTM, BS, DIN, and JIS.

In response to the above situation, TCVN based on GOST/COMECON standards needs to be revised and updated to ensure consistency with the above standards.

GOST participates in ISO/IEC and thus is expected to be updated to comply with them. In practice, however, Viet Nam has not obtained the latest versions of GOST on a continuous basis, so that no updating has been carried out. COMECON

standards have presumably ceased to be updated. Thus, TCVN based on these standards is almost certainly outdated.

In the review process, it is recommended to give priority to standards which are related to the priority areas proposed below.

3) Adjustment of national standards to the local technological level

Coordination of TCVN with international standards needs to be carried out step by step with priority being given in the areas proposed below.

In the coordination process, adaptation to domestic technology levels is very important. In particular, due consideration should be given to technologies which are widely used within the country and for which no serious problem is reported in regard to safety, public health, environment, and/or consumer protection, so as to ensure that they are excluded on account of not being in need of coordination with international standards. In particular, the coordination process should be carried out after domestic conditions are studied in detail, including quality and performance levels of raw materials and products distributed within the country, the scope and extent of their specifications in standards, and differences in classification.

As action for the above, Projects #3 and #4 recommend development of the relevant standards, and matters to be taken into consideration in adjusting the difference in the international standards and local national standards.

4) Promotion of standards development for which there are particularly strong need

Most TCVN standards developed recently have been created in response to public administration needs. Many of them also have needed development or revision for reasons related to industrial development, and thus it is recommended to carry out the activities in a planned manner.

The areas for which there is a strong need for standards development, as identified in the study, are summarized as follows[4]:

a) Development of standards which contribute to prevent confusion in trade and designing of products
b) Review of GOST- and COMECON-based standards to ensure consistency with international standards
c) Adjustment of TCVN with international standards when adaptation to international standards alone would not match domestic technology levels

[4] The present study primarily covers machinery, metalworking, and electrical and electronic subsectors, with secondary focus on textile and apparel, construction materials, and petroleum products.

d) Standards required for expansion and reinforcement of mandatory product certification

e) Basic standards used for quality control promotion

f) Standards used in international trade

g) Standards related to environmental protection

The standards for which the need for development is strong include:

1. Those related to metallic materials: particularly those requiring adjustment in conformity with foreign standards commonly used, with the above (a) and (c)
2. Those related to machine components: particularly those requiring adjustment in conformity with foreign standards commonly used, with the above (a), (b) and (c)
3. Those related to electrical standards: particularly relating to and with objective of coordination with IEC and consumer protection needs
4. Basic standards required for promotion of quality control: sampling method, terminology, statistical methods, etc.

The above is recommended to be implemented by VSI. If the available resources and funds for implementation are limited, the target should be set in accordance with implementation of Projects #3 and #4, for the system development.

5) Dissemination of standards

Promotional activities will be conducted on the basis of actual standards. In particular, it is recommended to focus on the following:

a) General information diffusion and educational activities in transition of TCVN to IEC as the base - Seminars and similar activities to deepen understanding of standards and their content, and testing methods. They include preparation and dissemination of comparison tables of foreign standards and TCVN of metallurgy fields.

b) Technical seminars and similar activities related to coordination of machinery-related standards (GOST/COMECON-based) with ISO/IEC

c) General information diffusion and educational activities related to standards accompanying the enhancement of mandatory product certification - To promote the understanding of standards and testing methods, and to provide consulting for manufacturers to assist in improvement of production technology

d) Activities to promote use of standardization within companies

6) Enhancement and expansion of technical information centers

There is a high potential need for technical information centers, which would collect the above information and data, and conduct information diffusion activities.

In addition, as these activities are carried out under the constraint of limited resources, those in Hanoi and Ho Chi Minh City should be planned in an integrated manner for efficient use of resources.

There is always a strong need in industry for technical information. It is difficult, however, to obtain technical information on foreign standards, international standards, and quality control. While foreign standards and international standards are furnished by customers, frequently they do not provide all relevant portions, and basic standards as well as related standards often are not available. Recently ISO began to provide technical information useful for standardization, even though the development of those standards is premature. Many industrialized countries similarly are making available in-progress information on national standards and accessibility to these information sources is important.

In addition, information on CE and certification in EU and other countries is important to make exports grow in the future.

3.3 Certification and Accreditation System

The certification and accreditation system in Viet Nam is still in the development stage and there are many tasks to do including improvement of the system, development of human resources, and the establishment of operation methods. From the viewpoint of fundamental strengthening of industries, it is important to give incentives for enterprises to make their own efforts on behalf of standardization and quality control, through the establishment of effective voluntary certification systems. Under the conditions of an increasingly open economy, the following two seem to be essential; firstly, to create the level playing ground for domestic enterprises, and preventing the inflow of substandard products from foreign countries by enhancing a mandatory certification system; secondly, to remove obstacles for domestic enterprises to gain access to the export market, by establishing a voluntary certification system that is internationally acceptable.

The following, by addressing the major issues, examines the opportunity for developing an effective certification system.

3.3.1 Activation of the voluntary product certification system

(1) Major issues identified

As for the issues relating to voluntary certification, the major points include how to make the system more effective, and how to develop or reorganize the existing quality registration system and import/export inspection system in relation to the certificate system.

As of March 1997, 160 enterprises throughout the country were granted product certification. Of them, those which obtained mandatory certification accounted for 70% (112 enterprises) while only 48 obtained voluntary certification. More precisely, nearly one half of the latter (23 enterprises) is in the cement business. Thus, the number of enterprises obtaining voluntary certification is relatively small, with concentration in a certain industry, partly because of a relatively short history of the certification system.

In fact, while the quality registration system is widely recognized among enterprises, little is known about the product certification system (other than mandatory certification). Furthermore there are few incentives for enterprises to obtain product certification. All in all, it is far from reality to state that the product certification system can be used as an important instrument to promote dissemination of standardization and quality control at the level of individual enterprises, and thereby to help modernize the industry as a whole.

On the other hand, the quality registration system and the export product inspection system, which are widely adopted in the country and considered as certification systems in a broad sense, have their own limitations. Although these systems serve as affirmative measures to drive out substandard products from the market, including quality inspection at factories in accordance with specific standards, they are not powerful enough to encourage individual enterprises to incorporate standardization and quality control into their design, manufacturing and other business activities, leading to an industry-wide movement.

(2) Discussion

Generally, a product certification system refers to verification by a third party organization that a product conforms to specific standards, allowing the same products manufactured under the same conditions to bear a certification mark. The system is used in many countries for the multiple purposes of quality improvement, the rationalization of production practice, simplification and fairness of trade, and standardization of product specifications and consumption patterns. So far, it has been

making diverse and significant contribution to industrial development, trade promotion, and the improvement of standards of living.

The certification system does not create and maintain its own value by government regulation. Rather its value must be discovered by its users, namely individuals and businesses which obtain the certificate and use it for their own benefits. In this sense, it should be clearly distinguished from the mandatory certification system which is used as part of government activity to regulate product quality and market distribution.

From the business point of view, there must be differences in needs for the certification system between manufacturers of export products and enterprises supplying products to exporting industries as well as joint ventures, and enterprises serving the domestic market only. Manufacturers in the former category generally follow foreign standards and require certification (or verification) by an organization acceptable to their customers. In other words, certification which does not meet customers' requirements is useless. In contrast, manufacturers serving the domestic market are not necessarily required to comply with international class standards. In fact, it suffices to meet specific quality and performance standards and obtain certification (or verification) by a trusted organization authorized to issue such certification in the country. As a result, the upgrading and activation of the certification system must be considered on the basis of these differences in needs.

The second factor to be considered in activation of the certification system is to create expectation for certification among potential users that they can enjoy large benefits from it. This can be accomplished by raising general confidence in the system as well as market recognition of products and their manufacturers which receive the certificate under the system. It is important to realize that confidence in the system is easy to lose and hard to regain unless properly administered. To ensure that the system works effectively, the following conditions must be satisfied:

a) Standards as the basis of certification gain confidence in the market and ensure minimum required levels of product quality and performance acceptable in the market.
b) Manufacturers have technical and quality control capabilities to meet product levels contemplated in the standards.
c) Manufacturers realize that the standards set forth minimum required levels and they must make consistent efforts for "improvement (kaizen)" to achieve higher levels on a dairy basis.
d) The certification system must be considered reasonable in terms of content, assessment criteria and methods.

e) Assessment on certification must be carried out in a fair, strict, and neutral manner, so as to leverage confidence in government.

To achieve these objectives, the administrator of the system must focus on the following activities: (1) the enhancement of the certification organizations by means including securing of their legal status, (2) the development or updating of base standards, (3) the establishment of the inspection organization and resources to support the system and its operation, (4) complete coverage of products to be certified under the system, and (5) implementation of measures to improve capability of enterprises in their quality management[5].

Finally, the quality registration system in place is analyzed for its limitations and future directions of modification. In short, it is difficult to understand as it incorporates procedures and activities having different purposes and characteristics, namely submission of testing data based on specific standards, the use of trademarks, and marking. Nevertheless, the quality registration system has been serving dual purposes, promotion of quality and regulation of product distribution. As this report focuses on the former, it is out of our scope to discuss as to whether the system should be terminated or continued.

From the viewpoint of quality promotion, it is important to accept the system's affirmative role in the standardization and quality control process and to evolve it to a more effective form. At the same time, however, it should be pointed out that the quality registration system increasingly faces difficulty in keeping up with rapidly changing technology as it requires every product to be registered on the basis of a fixed set of product standards. Furthermore, if required procedures are fully enforced, demand for review and evaluation will increase and will be hard to be satisfied due to the shortage of assessors in terms of both quality and quantity. Under these circumstances, it is recommended to integrate the system with similar schemes (e.g., voluntary or mandatory product certification systems) according to product category and purpose. This way, limited human resources can be effectively utilized, while allowing the improvement of the system "to ensure that a certified product consistently meets standards" which is not fully warranted under the current system.

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[5] At the same time, efforts should be made to encourage enterprises to adopt activities required to maintain the certification, with company standardization and quality control, etc.

(3) Recommendations for the case in Viet Nam

1) Activation of the product certification system

The currently used product certification scheme follows international guidelines and thus is considered to have a sound foundation. On the other hand, the improvement of the functioning of the system is required, in five areas: (1) complete coverage of products to be certified under the system, (2) the development and enhancement of standards as the basis of the system, (3) the reinforcement of the certification organizations and the securing of their legal status, (4) the reinforcement of testing ability and human development, and (5) implementation of measures to improve capability of enterprises in their quality management.

a) Complete implementation of the voluntary certification system, with limits to the products covered

Complete coverage has twofold meaning: a certified product should go through the assessment process which ensures that it satisfies applicable standards consistently; and the system should be able to assess completely all the products subject to the voluntary certification system.

As an example of incompleteness of assessment process, take a manufacturer who has obtained the mandatory certificate. It does not have its own testing equipment, has products to be delivered to the government receive QUATEST's tests, and ships those which have passed the tests. It does not, however, perform any inspection of products which are delivered to customers other than the government. As the manufacturer does not seem to manage the production environment properly, its products are expected to vary significantly from each other in terms of characteristics. The assessment process prior to certification must review quality-related manuals and procedures thoroughly and include an accurate in-process review, so that the production performance can be evaluated properly, and product inspection too can be done properly. To achieve this, the development of operation manuals for the assessment process, and education of assessors, become urgent tasks.

Regarding the incomplete coverage of products, the present voluntary certification system in the country (J-4, 6 and 7 in Figure 3-1) covers all the products for which product standards are established, going beyond national standards. Yet, a variety of conditions, including those listed below (b to d), must be met for the certification system to successfully function. And it is very difficult, if not impossible, to satisfy all these conditions at once. When resources are limited (as they always are), the

ability to manage a certification process covering all products and including paper work will soon be exhausted. Also, the inspection system itself cannot cover everything.

One solution is to use two different certification schemes according to product types, one covering product items bound to the domestic market, primarily based on TCVN, and another covering those supplied to the international market or foreign companies operating in the country.

First of all, products shipped to the domestic market should be subjected to "selected certification" at least in the early stage by specifying the reasons, so as to ensure that the scheme is effectively built and accepted by users in view of the limited time, budget, and effort.

Selection in this case should obviously be based on actual needs, in which case the following criteria apply:

1. Products which help improve international competitiveness
2. Those which help upgrade technology levels of small- and medium-sized enterprises
3. Those which can reduce the burden for customers who lack the ability to conduct proper acceptance inspection on products received
4. Those which contribute to consumer safety and health as well as pollution control and disaster prevention (these product items are subject to mandatory certification)

Based on these criteria, products are classified according to priority, and those with high priority (say, the upper one-third) are selected by weighing expected demand and the ability to meet it. In fact, selection should reflect economic and social needs which change from time to time, together with the present stage industrialization process and industrial trends. Thus, priority areas need to be reviewed and modified over time. Note that new items can always be added when the situation permits.

Secondly, certification for enterprises who serve the international market or foreign companies operating in the country is properly characterized by a variety of items, and therefore demand for foreign standards or equivalent TCVN to be adopted as the basis of certification. In this case, it is more appropriate to rely on the existing product certification system (J-6 or J-7 in the aforecited Figure 3-1) to check for compliance with foreign standards, rather than to designate certain products (this matter is recommended as Project #4 in 4.4).

b) Development of standards as the basis of the certification system

Again, the development of base standards needs to follow a two-pronged approach,

TCVN-based certification of products bound to the domestic market, and certification based on foreign or international standards focusing on the enterprises active in the international market and trade with foreign companies operating in the country.

The present certification scheme is primarily based on TCVN. Nevertheless, production by joint ventures and foreign-affiliated companies requires certification of a third-party organization on the basis of foreign standards (quality and performance). In fact, this type of need is expected to enjoy early benefits from the certification system. The need can be effectively met by using foreign standards (provided that the certification organization must attain the confidence of the public, as discussed later).

Needless to say, it is not realistic to expect that every domestic enterprise can meet such quality and performance requirements. On the other hand, some customers accept products of substandard quality and performance, by giving priority to price. It is therefore important to develop standards that support the certification process to meet such need for the purpose of fostering domestic industries. In an effort to ensure consistency with international standards, which will be increasingly required in future, the development of new standards which are appropriate for technology levels in the country is essential while efforts are made to avoid conflict with international standards, rather than mere application of international standards[6].

c) Reinforcement of certification bodies with securing of legal entity of accreditation body

Reinforcement of certification bodies by means of securing appropriate legal status for the accreditation body is essential to activate the certification system, in particular if the certification is demanded by enterprises which serve the international market or foreign companies operating in the country.

At present, there is no certification organization satisfying ISO/IEC Guide 65 which sets forth requirements for such an organization. Whether the certification system is accepted as a reliable service provider by enterprises at large depends upon whether QUACERT can obtain and keep public confidence. TCVN-based certification primarily seeks validity within the country, and thus basically serves the purpose so far as the certification scheme is authorized in the country. On the other hand, foreign customers and foreign enterprises operating in the country are not satisfied with the domestic system.

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[6] See 3.2.

ISO/IEC Guide is designed to overcome the gap and build an internationally recognized certification system. However, the absence of a certification organization established under this guide prevents accreditation of QUACERT in the country. The first step should therefore be to establish a national accreditation organization. If it is not feasible, certification bodies should be accredited by a reliable accreditation body of another country, as an alternative.

Further, a measure to improve the capability of assessors should be developed together with the establishment of evaluation and registration procedures of qualified assessors (the recommendation on the accreditation body is included in 3.3.3).

d) Establishment of the inspection organization and resources to support the system

Product certification requires adequate testing and inspection equipment. QUATEST, however, is limited in its holdings of equipment and is only capable of performing tests on a limited range of products. In fact, some joint ventures have sent products to an overseas organization for type certification.

To address the issue, the two-pronged approach is again recommended, to divide certification demand into two segments, namely TCVN-based certification on products for the domestic market, and foreign standard-based certification for the international market and foreign companies. Then, the upgrading of the inspection system will focus on the former segment.

For the latter segment, many enterprises applying for certification own the necessary testing equipment and measuring instruments; without them, the enterprises are unable to conduct quality control procedures to ensure that their certified products consistently comply with applicable standards. The application for certification will be reviewed by using testing equipment and measuring instruments owned by the applicant, and should proceed in the following manner:

For instance, if an applicant is found to own properly calibrated equipment for testing and inspection of quality, the applicant should be allowed to conduct the required tests with the attendance of an assessor who accepts or rejects the test results.

The assessor's attendance at the compliance test can be done in the following way:

1. On the day of assessment, test specimens are collected at random from a lot or batch for which final inspection has been completed.
2. The current state of testing equipment used by the applicant is checked.
3. The test using the specimen is conducted in the presence of the assessor who checks whether the test is being carried out with the use of the above testing equipment, and in accordance with the specified testing method.

4. The assessor checks the test result and accepts it, if it is sufficiently within a range of past acceptable test results given a reasonable tolerance.

Then, TCVN-based certification of products for the domestic market must assume that some of applicants do not have adequate testing equipment and measuring instruments[7]. Thus, a necessary test of testing equipment must be provided by the certification organization for all the product items to be tested. To achieve this, the accreditation of testing laboratories should be expanded to secure equipment, and equipment in short supply should be procured by QUATEST[8].

e) Provision of encouragement measures for certification

In order to encourage enterprises to apply for certification, the government should take as many measures as possible; e.g., provision of preferential treatment for the products with certification in the government procurement.

2) Leveraging affirmative roles of the quality registration system

As pointed out earlier, to encourage enterprises with quality registration to participate in the quality certification scheme is the best way to leverage the affirmative roles played by the quality registration system; to incorporate standardization and quality control practices into design, manufacture, and other business activities; and to efficiently operate the current system by making the effective use of limited resources available. In this conjunction, submission of test data based on certain standards in the quality registration process is identical to product certification under the "product inspection system, so that it can be incorporated into the product certification process by separating it from the quality registration system. This will enable major benefits of the quality registration system -- the ability to maintain quality and conduct product inspection based on specific standards -- to be enjoyed by the product certification system. STAMEQ is in principle considering the same approach.

Under the current system of voluntary certificate "A", two ways of assessment methods -- (A') and (A) described in the following -- are used depending on the importance of products. The mark "A" is allowed to be attached to the products certified under the system, regardless of the method applied. However, use of the same mark is not recommended since the assessment method is significantly different

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[7] In principle, the applicant is not eligible for certification in the first place, but it should be realized that some companies are expected to use external testing service and others change the status from the quality registration system.

[8] See 3.5.2 for detail.

among them.

Generally, product certification can be roughly classified into the following two methods:

- (A') "Product inspection system" - To inspect a product only for compliance with specific standards
- (A) "Factory investigation system" - To consider the factory as an integrated production system from materials receiving to shipment of final products, and evaluate the system on the basis of its technical and quality control capabilities to produce products complying with specific standards in a continuous manner.

Method (A) is generally carried out in the following three stages:

1. To conduct type inspection for the product to check compliance with applicable standards.
2. To review the quality control system of a factory manufacturing the product and check if it has the ability to manufacture in-compliance products in a consistent and continuous manner.
3. To test samples collected from the market and the factory after certification for follow-up audit to check if the original quality control system is maintained.

Although the method tends to be complex in the review and other procedures, and takes time and money, it offers a good chance of "ensuring high market confidence in certified products" -- the critical requirement for the certification system -- and is used in many countries. The current certification system in Viet Nam is also based on method (A) and in line with ISO/IEC Guide 65: 1995, though the method (A') is also used depending on the importance of products.

Quality registration is initiated by submitting:

(1) Test data based on standards
(2) Trademark
(3) Content-of-product label

If they conform to applicable criteria, a registration number is issued, primarily based on document review. The scheme is designed to ensure accurate indication of product quality, thereby to provide accurate product information to consumers, prevent consumer disputes related to products, and distribution of products with false indication.

Among the above three requirements, trademark in (2) and product label in (3) are not necessarily handled in the product certification process, and are currently managed by the Industrial Property Department of MOSTE. In addition, the former is protected by the law relating to trademark. On the other hand, submission of test data in (1) is

equivalent to product certification under the "product inspection method." Thus, (1), (2) and (3) should be clearly separated, and (1) will be incorporated into the product certification process, while (2) and (3) will continue to be controlled by the Industrial Property Department.

The recommended transition process is as follows, as shown in Figure 3-2:

a) Quality Registration (1) corresponds to Production Certificate (A') under Production Inspection Method. The current "Product Certificate A" includes certificate by method (A'). Both (A') methods are to be integrated into a new Mark A'.

b) The products which may be transferred from Quality Registration to Mark (A') are to be limited to those for which there are TCVN. For such products without TCVN, a new TCVN is to be established within 3-4 years, and these products are to be transferred to Mark (A') within 5 years, during which time the Quality Registration is abolished.

c) The products for which safety is particularly important are to be transferred to "Product Certificate B".

d) After completion of the transition period described above, the products with Mark A' be transferred to Mark A within another 5 years, in order to avoid co-existence of two types of marks.

Under the above arrangement, enterprises that have obtained quality registration can benefit from the following privileges which are also incentives for conversion:

a. Renewal of quality registration is not required.
b. Mandatory export inspection is not required.
c. The product designated as a domestic product is eligible for tax reduction.
d. The certification organization publishes a list of certified products.
e. The certified product can be used for advertisement purpose.

Nevertheless, to promote the arrangement in the aforecited Figure 3-2, QUACERT's organization, which is responsible for actual certification work, does not seem to be sufficient. It is therefore recommended to establish the "Promotion Team for Unification of Product Certification" and authorize it to carry out planning and implementation on its own. The team will be joined by representatives of ministries other than MOSTE, which are associated with quality registration. It should be dissolved when conversion of quality registration to the (A) method has been completed.

3.3.2 Expansion of mandatory certification

(1) Major issues identified

As seen in other countries, the mandatory certification system in Viet Nam is applied to products which have potential serious impacts on consumer safety and health, and the environment, and if a particular product does not conform to applicable standards, it is not permitted to be sold. Nevertheless, the current system has the following drawbacks in relation to operation:

1) Not all products subject to mandatory standards are subject to mandatory certification. In fact, the limited ability to handle certification work results in coverage of two types and three items (electric wire [bare and PVC-covered] and electric fans).
2) The review items are limited to compliance with safety standards, and do not cover compliance with quality standards (while some products applying for voluntary product certification are subject to quality and safety standards, if any).
3) Mandatory certification of the limited items is not always carried out. While each certified product manufactured domestically is required to bear an affixed certificate stamp having a serial number (issued by QUACERT), and imported products with a certification seal (only a mark, no serial number), such marking is only found in products of a handful of manufacturers.

Meanwhile, opening up the economy has caused the great influx of diverse products into the country. In particular, low-cost, poor-quality products including used goods have an adverse effect on domestic enterprises and impede fair competition.

(2) Discussion

1) Mandatory product certification system

Mandatory product certification does not permit sales of a product which fails to comply with applicable standards. It generally applies to products which can have significant influence on consumer safety, health, and the environment.

The international trend now is for an increasing shift to the voluntary system of product certification which provides benefits to manufacturers who obtain the certificate. This is the desirable direction for the country in the long term. Nevertheless, until economic development reaches a certain stage of maturity, there is a high risk of local production or importation of a product which has a consumer safety and health and/or environmental problem due to the low technology levels of the manufacturers, the lack of product information furnished to consumers, and the insufficient ability of consumers to make accurate judgment in product selection. For

this reason, industrialized countries which have used the mandatory certification system to reduce such risk are still taking various measures including use of a similar system.

In practice, it is desirable to set forth certification requirements under mandatory provisions of laws and regulations, and establish certification criteria and reviewing and testing methods in standards. The following section examines various options and considerations under the unified concept of mandatory certification.

First of all, there are important points related to implementation of mandatory certification:

a) No product is not allowed to be sold unless it passes the certification process, which thus holds the key to the survival of its manufacturer. In this sense, mandatory certification should not be used for mere regulatory purposes. Rather, it should serve as a device to foster the industrial sector by combining it with an appropriate method for assisting enterprises in improving technology levels.

b) The system should be enforced to all applicable enterprises to ensure fairness. Also, the review process should be designed to ensure that a certified product meets standards in a consistent manner. For this purpose, an organization with the ability to conduct appropriate reviewing and having adequate equipment to perform inspection should be developed concurrently.

c) Standards and a certification system unique to a country may impede international trade, lead to market fragmentation, and increase costs for domestic industry, often creating negative influences on international competition. Care should be taken to ensure that they can be operated in harmony with international counterparts.

2) Similar system

The country has another system similar to the certification system in a broad sense, namely the export and import inspection system.

For import products, the system is designed to protect the health and safety of domestic consumers as well as the environment and applies to product items designated by law. Thus, it is also similar in purpose to the mandatory product certification system.

On the other hand, the export inspection system is designed to protect the product's reputation in the international market. In the country, it only applies to some of processed marine products. Although industrial products are not designated, they will likely be required to pass export inspection in future.

This type of mandatory inspection is used in a number of countries by designating different products according to each country's conditions, without any significant

trouble in operation. Nevertheless, the international trend is to move from the mandatory system controlled by government, to the voluntary system.

The latest move in mandatory certification related to safety is EU's "CE Marking Scheme" which recently has attracted attention. The scheme integrates safety regulations which are enforced in each of the EU countries and is designed to ensure smooth distribution of products the safety of which is warranted under the same standards.

Most importantly, the scheme divides compliance review procedures into multiple modules (at present, 9 types from A, Aa - H), which are incorporated in any combination to determine the method for assessing compliance for different product groups. According to the magnitude of danger, for instance. "Low-voltage electrical equipment," classified into Module A, is eligible for CE marking by self-declaration of compliance by the manufacturer. In contrast, "explosion-proof equipment" which has a very high risk of accident must obtain a type certificate issued by an EU-accredited organization and is subject to the approval and monitoring of the quality system. Needless to say, not all the products simply rely on self-declaration.

The self-declaration tends to be applied to mandatory certification also in Japan. Many products which used to be subject to mandatory certification are transferred to another category of self-declaration. The government, however, in this new case, protects consumers with follow-up activities of buying the products in the market for tests, and making warnings or giving instructions to make recalls of the defective products, if necessary.

These cases may be applicable only if the manufacturers have sufficient technological capability to ensure safety. In the case of Viet Nam, the manufacturers of electric fans seem to have the capability and can be authorized to use the self-declaration method.

(3) Recommendations for the case in Viet Nam

1) Strict enforcement

As the country further opens the economy and foreign products become available in the domestic market, mandatory inspection as described above is essential from the viewpoints of consumer safety and health, and the environment To accomplish the objective, the mandatory inspection system must first gain the public's confidence, as seen in voluntary certification. In particular, it must be enforced consistently throughout the country. In reality, however, products which do not bear the safety mark are sold in the market. This undermines the foundation of the certification

system as well as the authority of the state as law enforcer. As a result, the system does not live up to its promise of being "the scheme relied on by the market."

This issue needs to be addressed from three aspects. First comes the question of urgency: How critical is a safety factor for a product subject to mandatory inspection? If most of products do not bear the safety mark and few problems occur, the product item should be removed from mandatory inspection so as to allocate scarce resources to other important items.

Secondly, if full-scale enforcement is difficult due to the shortage of human resources, consolidation of various schemes (including similar ones) should be considered.

Primary candidates are import and export inspection systems.

Under the current import/export inspection system, each year the government publishes a list of applicable items, which must be inspected on export or import by a designated inspection organization according to TCVN or other specified standards. For products complying with the standards, the acceptance certificate is issued by the inspection organization and must be presented to the customs bureau for clearance. Each lot of products which are subject to customs clearance are inspected.

The factory investigation system which is used in the mandatory certification method will be difficult to use for export and import inspection. However, mandatory certificate with type approval may be applicable, by which means it becomes possible to abolish product inspection by import lot. At the same time, it seems to be important to simplify inspection procedures by exempting products which bear designated foreign marks. In future, mutual recognition with certification systems of countries exporting to Viet Nam should be considered[9].

Export products which have received product certification are exempted from export inspection in an attempt to encourage exporters to acquire product certification. In practice, however, designated product items are limited to processed marine products. If the scope is to be expanded to industrial products in future, it is desirable to incorporate it into product certification under the factory investigation method which includes the quality system in the review process.

Thirdly, a question must be asked about division of responsibility and delegation of power in relation to the scope of mandatory certification. At present, the Ministry of

[9] It should be initiated only after both certification systems are fully deployed.

Health designates product items under its jurisdiction for mandatory quality registration and export/import inspection. Such decentralization should be extended to other areas. As mandatory certification generally goes beyond the framework of public administration in the areas of quality and standardization, it should be administered on the basis of each policy area. In other words, it is appropriate for each government agency or professional organization to be responsible for mandatory certification in its own area of competence. Such areas include food, medicine, and construction. It should be noted, however, that flexibility should be retained in use of scarce resources (e.g., manpower and equipment) by jointly operating and managing activities whenever possible. Also, different schemes should be designed on the basis of the working principle of coordination and joint use in order to avoid confusion in production and distribution. Finally, the development of standards used as the basis of mandatory certification should be carried out under STAMEQ's unified system to ensure that they meet specific requirements[10, 11].

2) Expansion of product items and the securing of the enforcement resources

At present, mandatory certification does not cover all of the products for which mandatory standards are established. In fact, the insufficient ability to process applications and certification work limits product items to two types and three items (electric wire [bare and PVC-clad] and fans). The list should be expanded by selecting products according to priority within a specified period of time.

The assessment method should be improved by adoption of the factory investigation method.

As for the expansion of product coverage, the highest priority should be given to the updating of safety standards for consumer protection with a view to preventing electric shock and fire hazards, and the addition of more items should be considered. The implementation of expansion in the following are recommended:

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[10] Particularly on the transparency of procedures, and harmonization with other standards.

[11] Such operation may be implemented with regulating it through enforcement of law, which regulates the mandatory inspection, while referring its technical specifications to standards, instead of regulating directly by mandatory standard. STAMEQ only provides the technical basis, whereas the authority concerned is responsible for controlling the subject according to the law.

1. Rigid and flexible cables with insulation, and sheath if any (for indoor and outdoor use)

   Reason: Since allowable current for cable varies with sectional area and conductivity of those conductor, and maximum resistant temperature of insulation, uniform specifications should be set to allow the contractor to determine allowable current for cable to be installed, thereby preventing excessive heating of wire, deterioration of insulation, and electric leakage and fire hazards.

2. Fuses and circuit-breakers (for protection of fixed wiring)

   Reason: If cables and wiring devices are used under overload conditions, and if overcurrent due to overload or short-circuiting is not cut off within a certain period of time, excessive heating and firing occurs and electric shock and fire hazards are created. Furthermore, transformers may be damaged so as to adversely affect the electricity supply system as a whole.

3. Socket-outlets, plugs, and lamp holders (for compatibility)

   Reason: Mating failure (excessive heating) due to dimensional error in fittings and the use of incorrect voltage under same dimensions (excessive heating due to overvoltage) create electric shock and fire hazards.

4. Irons, hair dryers, and room heaters

   Reason: These products can easily be manufactured without advanced technology, their quality is considered next to cost, and the use of a heating element creates a risk of fire.

5. Pumps and washing machines

   Reason: There is a high risk of electric shock as they use water.

In addition, in the future, the expansion of product coverage to such products as construction materials including cement, ready-mixed concrete, and reinforcement bars, and helmets for motorcycles.

However, these product items may be exempted from certification if it is verified that all the products are produced by reliable manufacturers.

Further, products subject to mandatory certification should not be fixed permanently. Rather, they can be removed from the list when their safety has been improved to a sufficient level, and should be replaced with other items with next-highest priority (or dealt with by voluntary certification).

Regarding the issues related to securing of enforcement, those pointed out for the voluntary certification system are also applicable. Items closely related to mandatory

certification are summarized below.

a) Development of standards

Standards used as the basis of mandatory certification should be made into national standards. TCVN standards currently available are lacking standards for electric and electronic products. For products which are not locally produced, imports are expected to grow in terms of both variety and quantity. Standards should be developed as early as possible, with an emphasis on safety for consumer protection[12].

b) Provision of technical support

In addition to the development of safety standards, production technology to ensure reliable supply of products on the basis of the standards is required. In particular, a product subject to mandatory certification cannot be sold to the market if it has failed to pass the certification test. In consideration to serious impacts on the manufacturer, the mandatory certification system must be combined with technical support to improve technology levels of failed manufacturers.

c) Provision of testing and inspection equipment

As seen in the voluntary certification system, testing and inspection equipment at QUATEST and accredited laboratories is available. In this case, technology levels of the accredited laboratory are not necessarily world class so far as mandatory certification is intended for domestic industries. On the other hand, QUATEST is required to own a minimum set of equipment and provide guidance for maintaining and improving technology levels of these laboratories through comparative tests and other means.

d) Improvement of public information activities

In enforcing mandatory certification, efforts should be made to advertise it widely among consumers and users, to encourage non-certified products to be driven out of the market in the form of voluntary effort, in addition to regulatory control.

3) International and regional cooperation in establishing the mandatory certification system

The mandatory certification system, among other things, has a high risk of creating trade barriers, and care should be taken that it functions according to internationally harmonized standards and certification schemes. In particular, as the country imports

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[12] See 3.2.

a variety of products from neighboring countries, initiatives should be made to promote mutual acceptance of mandatory certification with these countries. This will help prevent trade barriers and contribute to development and use of the system.

In this conjunction, efforts to develop common standards (e.g., safety standards and testing methods) which serve as the basis of mandatory certification among ASEAN countries will be effective. While these standards must be based on international standards, they will not necessarily need to reach international standards if they meet safety requirements. Thus they should be designed by taking into account conditions including technology levels peculiar to the countries involved.

Further, joint activities are important to mobilize resources to enforce mandatory certification by establishing accreditation organizations for laboratories and sharing advanced measurement standards for calibration of testing and inspection equipment.

3.3.3 Toward an Internationally acceptable certification and accreditation system

(1) Major issues identified

One of major issues facing the present certification and accreditation system is that it has still to establish itself as an internationally acceptable system. The major factors contributing to this are summarized as follows:

1) QUACERT, which is expected to become the sole organization responsible for all the certification schemes, does not have independent legal status and does not satisfy ISO/IEC Guide 62 in various aspects. Thus there is no certification/registration body which can be accepted in a mutual recognition arrangement.
2) There is no accreditation organization complying with ISO/IEC Guide 61.
3) The accreditation body (BOA) and the certification body receiving accreditation (QUACERT) belong to the same organization.

The present system can work effectively so far as it is used to certify domestic enterprises for matters within the country. However, it must overcome the above issues if it is to move toward mutual recognition with other countries. Also, to promote the certification system to individual enterprises, it must demonstrate tangible benefits, and that the internationally acceptable system is an essential factor for enterprises serving export markets and foreign companies to use the system and gain the rewards.

(2) Discussion

At present, efforts led by STAMEQ are under way to develop the certification and accreditation schemes to the "internationally acceptable level," as shown in Figures 3-1 (aforecited) and 3-3. They contain varying levels; some are at the preparation stage, while others will be improved or are already in operation. Nevertheless, the initiatives, which were launched in the past five to six years, have produced successful results, including detailed research and study on world levels and trends as well as foreign cases.

Figure 3-4 represents a model of a certification and accreditation system which can be accepted in a mutual recognition arrangement with a foreign country. STAMEQ's vision seems to roughly match this. Table 3-1 shows the documents on inspection procedures and criteria, which are necessary to be prepared by the accreditation body indicated in Column (E) of Figure 3-4 (aforecited). The documents are numbered as those of BOA, provisionally.

The above issues have also been recognized by STAMEQ, and they must be addressed and dealt with under restraints including limited resources and the lack of readiness on the user side.

(3) Recommendation for the case in Viet Nam

1) Use of limited human resources

To build the system which meets the above requirements, an organization and resources need to be mobilized and assembled in accordance with the ISO/IEC Guide. The major obstacle to this is the shortage of qualified personnel, and it is imperative to ensure the effective use of available human resources.

At present, there are 20 assessors who have completed the training course approved by IRCA, and they have to be fully utilized at the initial stage. Although they have completed lead assessor training, they lack actual experience and need to be given opportunities for gaining practical experience, such as:

a) Participation in second party review conducted by private enterprises
b) Participation in reviewing of local enterprises by foreign registration organizations as observer
c) Participation in preliminary reviewing or surveillance of testing laboratories as observer

Having accumulated practical experience, they will be registered with assessor evaluation and registration organizations to serve as key members in preparation for the following accreditation system and assume principal roles in each section of the accreditation system:

a) Instructors at the assessor training institute
b) Assessors of the reviewing and registration organization
c) Participation as assessor in preparation for the establishment of the accreditation organization and accreditation reviewing

2) Ensuring accreditation body

Ensuring a qualified accreditation body is one of the most urgent issues for completing the organizational set-up.

It is possible to establish an accreditation body jointly by a few countries. Such undertaking will be efficient in view of scale of economy, particularly for the countries where only a limited number of certification bodies are expected to be operated. Further, such joint undertaking may be possible among ASEAN countries.

Nevertheless, the establishment of a joint organization might require a considerable time to coordinate opinions and interests of participating countries, and it might not be likely to be realized within a relatively short period of time. Also, as more organizations apply for accreditation, it will become necessary for each country to have its own accreditation body.

In the case of Viet Nam, there is an existing accreditation body, BOA (Bureau of Accreditation) for the laboratory accreditation scheme. Since the number of certification bodies to be accredited is expected to be very few, except for QUACERT, it will be more practical to make the existing BOA as the national accreditation body covering other accreditation schemes.

An issue concerning establishment of accreditation body in Viet Nam, however, is the fact that both BOA and QUACERT are under the same authority, STAMEQ.

ISO/IEC Guide 61, the international standard for accreditation organizations, sets forth as follows:

a) To treat applications by the home country and other countries equally;
b) Not to give a specific applicant organization discriminatory treatment, either favorably or unfavorably.
c) To ensure that the management organization is capable of treating interests of all the parties related to the accreditation process in a fair and equal manner; and
d) If the management organization is unable to secure impartiality, an advisory board should be organized in such manner to ensure that the interests of all the parties are treated equally. The governing board shall be organized so as to ensure that it makes decisions honoring the advice of advisory board.

Also, in countries where accreditation and certification/registration bodies are part of government, as seen in Viet Nam, a mechanism should be devised to prevent the

accreditation body and the certification body from affecting each other. To achieve this, if the governing boards of the two bodies are made up solely of government officials, different members should be appointed to the accreditation body and the certification body, and each body should establish an advisory board to ensure impartiality. Needless to say, the two advisory boards should be organized by different members to ensure that opinions of the advisory boards are reflected in management of the respective bodies.

Even if impartiality can be ensured with the member structure of governing boards, different members need to be appointed to the respective advisory boards of the accreditation body and the certification body to prevent interference among them. It is important to develop a mechanism which effectively prevents the government from exerting influence on decisions of the governing board.

International standards to be fulfilled by the certification body are set forth in ISO Guide 62.

One of the requirements is impartiality of the certification body, as is required for the accreditation body. Organizational requirements to ensure impartiality and their explanation are same as those applied to the accreditation organization.

Following are two options to meet the above requirement in the case of Viet Nam:

1. Transfer and establish BOA out of STAMEQ (out of MOSTE if possible)
2. Transfer and establish QUACERT out of STAMEQ (out of MOSTE if possible)

Of these options, QUACERT is better to be taken out of STAMEQ in that a certification body can be managed independently better than an accreditation body because of higher revenue potentiality. Also, there will be more than one certification body functioning in the country in the future. In this case, because it would be desirable rather than make QUACERT have a special status to make it an equal of that body, it is thought that it would be realistic to take QUACERT out of STAMEQ.

Further, if both BOA and STAMEQ remain under MOSTE (though one of them must be taken out of STAMEQ), the impartiality requirement should be met with the above mentioned condition (d).

3) Human resource development

For the successful functioning of the certification system, development of resources for auditors, accreditation auditors, and internal auditors is essential.

Table 3-2 shows the projected number of auditors required for certification operation in Viet Nam. Immediate action is necessary for nurturing the qualified resources. Such development effort is better to be made intensively in a certain phase of

development. Implementation of Projects #3, and #4 is recommended in this context in Chapter 4.

4) Regional cooperation in development of the accreditation system

At present, there is not much interest in certification among enterprises. While there have been efforts among joint ventures to obtain certification of quality systems, few state enterprises have followed suit. Nevertheless, the certification and accreditation system requires a sizable organization and resources, and the above efforts will not be sufficient. There also is need for training personnel.

In fact, neighboring countries are facing a similar situation and are making rather fragmented efforts to develop qualified personnel. If such efforts are made jointly on a regional basis (such as by ASEAN), they will enjoy the economy of scale and achieve their purpose more efficiently and effectively. Regional cooperation in development of the accreditation system would be particularly valuable in the case of establishment of a joint training institute to develop qualified personnel in certification and accreditation[13].

3.4 Quality Control

(1) Major issues identified

In Viet Nam, the focal point of quality control is placed upon efforts "to exclude defective products from the market." Little attention is paid to efforts to analyze defects and identify their causes, and to improve the production process reflecting such causes. Clearly this represents the lack of a proper mindset and infrastructure to promote true quality control, and the concept is not consistent with the country's objective to develop the industrial strength which is capable of achieving sustainable growth under the new economic system. It is also evident from the fact that many enterprises do not own testing equipment and measuring instruments required for proper quality control.

At present, the country attempts to make manufacturers to ensure quality assurance by means of the quality registration system. Manufacturers are required to register the quality of their products and satisfy quality standards. To prevent shipments of substandard products, most enterprises have quality control sections (called KCS in Vietnamese).

[13] It should be established as a general training institute covering the areas of standardization, metrology, testing and inspection, and quality control, in addition to the certification and accreditation system.

On the other hand, they do not take an essential step in improving the production process, corrective measures against defective products found in pre-shipment inspection. In fact, the rejection rate is very high and often exceeds 10% in the industrial subsectors under the study. Small- and medium-sized foundries sometimes record 25%. Furthermore, there seems to be a high percentage of products that are returned to the production floor for reworking (most enterprises do not monitor the return rate).

Today, the country's major concern is the deteriorated competitiveness of state enterprises and their products. One major reason for this is the lack of efforts to reduce the rejection rate and the percentage of return products.

The quality registration system has been playing an effective role in protecting consumers from defective products. It also encourages manufacturers to carry out production on the basis of specific standards and have strong interest in product quality. Yet, it does not help achieve quality levels which are essential in developing the industry to give it the strength that enables sustainable growth in a market-oriented economy.

Another major obstacle to promotion of quality control in the country is the lack of required equipment. Many enterprises do not have a minimum set of testing equipment and measuring instruments, and some do not have any. They generally contract with outside organizations for testing service. However, this arrangement inevitably delays corrective action required for quality improvement because of the time lag until the test report is received.

(2) Discussion

1) Traditional concept of quality control in the country and new proposition

Under the previous centrally planned economy, factories gave priority to the manufacture of products in specified target quantities, and met the specific quality standards that had been provided. Under the market economy, quality standards must be constantly adjusted upward according to customers' needs. To meet customer demand and compete with others, enterprises must improve their management. In the new business environment, it is very difficult, if not impossible, for the Vietnamese manufacturing sector to sustain growth by relying on the traditional quality control method.

Modern quality control evolved from statistical quality control which was developed and emerged in the U.S. in the 1920s. It is now perfecting itself as total quality control. Conceptually, quality control expanded gradually from product inspection in the early stage and now is concerned with the improvement of business operations and

management from the design process and departmental communication, to chain of command and division of responsibility.

In the practice of quality control in its narrow definition, that is, to prevent the occurrence of defective products, an emphasis should be placed on proper management of each process, including design, production, and inspection so as to prevent the occurrence of any defect in product. Thus, preventive aspects are particularly important.

On the other hand, many quality control practices seen in Viet Nam do not contain such preventive and improvement aspects, and inevitably have the following drawbacks:

1. Much attention is paid to quality of individual products, not to the design and the production process which cause defects. As a result, the factor(s) for producing a defective product is not identified, and no improvement is made in terms of rejection rate and return rate, necessitating thorough inspection to prevent shipments of a defective product.
2. Each product is required to meet quality standards registered for it, while excess quality is not questioned. Thus as the shipment of substandard products is strictly controlled, manufacturers opt for "over-quality" and wasteful production may be intensified.
3. Any product subject to quality registration is required to receive inspection and certification by a third party organization. Essentially, however, the inspection checks operability of the product and does not cover performance.
4. Quality control activities are primarily led by the quality control section without participation of other sections who continue to lack quality awareness.
5. The quality registration system covers end products only, not intermediate products. Furthermore, because manufacturers of end products often register representative products of diverse product families alone, the registration and following inspection does not necessarily control all the products as initially designed. As a result, an increasing number of enterprises neglect the system and fail to conduct proper quality inspection.

2) Point of focus in introducing the new concept of quality management

The modern concept of quality control did not exist in Viet Nam when the nation was a centrally planned economy, so the country has few persons who profoundly understand quality control as practiced in industrialized countries. Although foreign-affiliated enterprises and joint ventures are striving to implement the new concept, they

have hard time to disseminate it to managers and workers who still espouse the old concept. While SMEDEC leads the promotional efforts, it is still at the stage that the word is being recognized by the public and takes some more time for profound understanding and acceptance.

The situation is understandable when one thinks about the business environment in which enterprises previously operated. Nevertheless, it is also a fact that wide adoption of the new quality control concept is essential to drive industrial development in the country. More importantly, given the low level of quality awareness, the process needs to be accelerated by using a strategy that enables quick and wide-spread adoption of the concept and its implications.

In this conjunction, one question should be raised: How well is the new concept of quality control understood in the country? The result of the questionnaire survey (see Annex 2) revealed that a majority of opinions equated quality inspection with quality control. This is reflected in the fact that, most enterprises have quality control sections which primarily perform quality control. Many enterprises know of SQC, but in practice they merely record the results of day-to-day quality control. The quality system based on ISO 9000 Series is relatively widely recognized, and many feel that they will have to obtain certification if customers require so.

On the other hand, little is known about key engines for quality improvement, such as the 5S rules and the 7 tools. Most enterprises visited by the study team are not aware of these tools; this is true from top management to middle managers. Similarly, the ISO 9000-based quality system is considered by many as the system to improve factory labs.

3) Certification of quality system and TQM

In the past few years, efforts have been made, under the leadership of STAMEQ, to promote the new quality control concept, including ISO 9000-based quality system and TQM. While these words are increasingly recognized, most enterprises have still to understand them profoundly or to put them into practice.

At the same time, there seems to be several cases of misunderstanding. For instance, some consider certification of the ISO 9000-compliant quality system and TQM as similar tools to promote quality control or as conflicting concepts, resulting in debate over which should be selected. Also, there are some cases where too much emphasis is placed upon tangible and immediate benefits of ISO 9000 (just to meet customer's qualification criteria). To fully utilize the potential of quality control in the production process, rather than using it as one way to secure business, it is important to

understand the relationship between the two concepts.

Quality control is translated to a range of activities conducted by the producer to create and provide a product or service that meets the customer's demand. At the same time, these activities will lead to the improvement of design and production processes as well as rationalization From the buyer's side, quality control represents quality assurance requirements to the supplier. In other words, quality control is a message from the buyer that the purchase of a product that complies with particular quality standards is of its primary concern, which must be met by the supplier. In many cases, it is difficult to ensure the quality demanded by the customer by relying on inspection only, particularly in the case of a product using advanced technology, and the supplier is required to develop a mechanism to ensure quality assurance in each step of the production process, rather than leaving everything to the inspection process. In fact, ISO 9000 is designed to set forth standards required to verify that a particular quality system meets a minimum set of requirements by means of a third party's certification.

Notably, requirements set forth in these standards are strictly based on scientific theories and principles, and following them in the quality control process is highly effective in building a quality control system as the first step of such efforts. At the same time, it allows the producer to improve its quality system.

It should be noted, however, that building the quality system and complying with procedures set forth in the system do not guarantee the bottom-up improvement of the manufacturer's competitiveness in terms of quality. Take a defect in the production process, for instance. In the buyer's eyes, a product defect does not present any problem so far as it is identified, removed or made good. To maintain this condition, the manufacturer is expected to perform inspection thoroughly and accurately. In addition, quality requirements which cannot be examined in the inspection process as they are incorporated into the product in a special process, specific production procedures and practices are established as supplemental conditions which also are binding on the manufacturer. From the manufacturer's viewpoint, however, strict inspection brings about an increase in the number of defective products found in its factory. This means external loss which would otherwise be suffered by the buyer is converted to internal loss, so that quality control does not create any benefit for the manufacturer. What the manufacturer should aim at is therefore not vigilant inspection, but the process which does not product any defect. Quality control practice should focus on identification and analysis of a cause for every defect and the improvement of the process to prevent its recurrence. Clearly, the current emphasis

on ISO 9000 lacks this view and vision.

Furthermore, TQM attempts to produce the results of improvement and prevention of its recurrence through participation of employees.

It has so far become apparent that quality control practice to meet the buyer's requirements is not an effective means to redesign the manufacturer's competitiveness. The manufacturer who can obtain ISO certification on the quality system certainly demonstrates that it has the ability to create and maintain a certain level of quality. It does not necessarily mean that, however, it has an excellent Quality Capability. In fact, this Quality Capability holds the key to the successful improvement of the manufacturer's competitiveness and strength.

Quality capability is said to consist of the following three elements[14] :

1. Capabilities related to design and production technology: The basis of product quality in sophisticated industrial products exists in its design and production technology specific to the industry. Without it, no manufacturer can manufacture a product of good quality.
2. Capabilities to improve in a planned, systematic and continuous manner: Any manufacturer must have the system to ensure quality improvement in a planned, systematic and continuous manner, because (1) existing technologies are far from perfection and need improvement in many respects; (2) there is always a shortage of competent engineers, and (3) the appropriate business process must be designed and implemented to effectively utilize competent engineers. Such system also helps accelerate technological advancement required in 1.
3. Capabilities to maintain the quality system: If the above two elements are firmly established, the successful quality system can be built with them as the foundation.

Thus, everything starts from technology specific to the industry, and TQM attempts to improve and establish capabilities in 2. and 3. above. In other words, without having established capabilities in 1. and 2., the quality system does not produce much effect even if it is well built. The quality system based on ISO 9000 is no exception to this. It must be operated in balance with actual advancement of the first and second elements. This is particularly critical in Viet Nam and other countries where engineering technology has lagged and the modern quality control concept has still to take root. There are a variety of quality control methods to be chosen according to

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[14] KUME, Hitoshi, "Outlook for Examination and Registration/Mutual-Acceptance Schemes for Quality Systems" (speech made at the 35th National Meeting of Standardization in 1992)

each country's social, economic, and cultural environments. TQM, among them, is a method the value of which has been proven in Japan and many other countries.

4) Quality system for SMEs based on ISO 9000

Small- and medium-sized enterprises are generally hesitant about the introduction of the ISO 9000-based quality system because of the considerable time and effort involved. As pointed out earlier, for small enterprises which primarily serve the domestic market, there is no justification nor incentive to apply the quality system unless their buyer requires it. On the other hand, implementation of a quality system is effective in ensuring continuous quality improvement by individual enterprises. From this point of view, a new quality system is desirable to be developed, one that is useful for continuous quality improvement, and recognizable by customers who pay for products that have quality assured by that system.

For the enterprise which adopts such a quality system, however, it is a virtual admission of its inability to introduce the ISO 9000-compliant quality system. While the quality system with reduced ISO 9000 requirements may not have any merit for manufacturers who primarily sell to the export market, it is a fact that there a sizable community of enterprises who would be recognized by their customers as having made a substantial improvement if they introduce the system. The quality system may be encouraged in the government procurement process as this will provide great incentives for small enterprises to develop their own quality initiatives on a voluntary basis.

There are several candidates for the quality system with reduced requirements, including Q-Base, that are under consideration in the country. It is recommended to develop or introduce the system which fits actual conditions of domestic enterprises, particularly small- and medium-sized enterprises.

(3) Recommendations for the case in Viet Nam

1) Quick and mass promotion of the new concept of quality control

Increased acceptance of the ISO 9000-based quality system and the certification system is important in the context of international assistance for Vietnamese enterprises. More importantly, however, they should learn and understand the new concept of quality control as the first step.

The concept, which has been defined as TQM in many countries, seems to be completely new to the country and there are few people who understand and can teach it to others. Given the anticipated pace of industrial development and the importance of promotion of quality control, strategic focus should be placed on human resource

development in the field, including personnel engaged in promotional activity, which must be carried out quickly and on a large scale by establishing an appropriate system including adequate resources.

Promotional activities should target the following three levels:

1. Facilitators and leaders serving as trailblazer and central player
2. Individual enterprises
3. Students who will participate in industry in future

The first step should concentrate on education of leaders who will be essential in developing human resources in the other two categories. Then, the leaders will become the core in educating enterprises and future generations.

The leaders are divided into the following levels:

a) Facilitators: To engage in research and development of quality control methods suitable for the country as well as educational activity. Facilitators are appointed from university faculty, those responsible for production technology in enterprises, and STAMEQ staff.

b) Staff members: Responsible for designing various promotional programs as well as curriculum at central organizations (STAMEQ's Training Center and SMEDEC)

c) Core leaders: They come into direct contact with enterprises' management and workers, to teach actual quality control practices, including how they work. As there are no persons experienced in quality control at local enterprises, core leaders will be appointed from staff of SMETEC and SMQ staff (provinces and designated cities) who will receive appropriate training. At present, SMQ staff are primarily responsible for duties and services related to legal metrology and regulatory measures including quality registration. As the mandatory certification system expands in future (see 3.3.2), technical assistance including guidance on quality control (primarily focusing on technical consultation through testing service) will become their important responsibility in addition to regulatory control.

In promotional efforts for individual enterprises, it is important to take into account the presence of highly skilled workers in the manufacturing sector. In fact, many enterprises maintain production levels by compensating for the shortage of equipment by workers' skills. These skills are highly useful in future quality control activity. What is lacking in the country now is technical capability to organize quality control efforts. The first phase of promotional activity should therefore target top management and middle managers by teaching the fundamental concept of quality

control and practical methodology.

As for the recommended action, see Project #1 in Chapter 4.

2) Procurement or upgrading of testing equipment, measuring instruments, and calibration equipment to support quality control practice

Except for foreign-affiliated companies and joint ventures, local enterprises do not have a sufficient set of testing equipment and measuring instruments required for quality control, without which data collection and analysis -- essential activities leading to quality improvement -- cannot be performed.

Most enterprises well realize the need for maintaining product quality and have their products checked by outside testing organizations. Nevertheless, if an outside laboratory is used, it takes too much time to obtain the test results, to take appropriate corrective action in time on the basis of the testing result. In principle, testing equipment and measuring instruments need to be installed near the place of production and should preferably be owned by each enterprise or a third party organization to which individual enterprises have easy access. In Viet Nam, two methods seem to be viable. The first method is to encourage large enterprises to procure necessary equipment and allow it to be used by nearby enterprises. In this case, large enterprises will receive service fees which will help pay to upgrade equipment in future. The second method is to install equipment at public organizations in major industrial areas for use by enterprises. Such public organizations can include QUATEST and DOSTE in provinces and designated cities. It should be noted, however, that the contemplated equipment is not very large. Also, as testing equipment should be located in easy access to many enterprises, it should be flexibly allocated, e.g., special branch offices should be established in industrial estates, in addition to existing laboratories and other organizations.

As for the recommended action, see Project #1 in Chapter 4.

3) Dissemination of quality control to key enterprises

In addition to equipment supply, concentrated efforts as promotion, aimed at selected enterprises (key enterprises) on a pilot basis, are expected to be an effective means to ensure quick and mass dissemination of quality control in concept and practice. This way, other enterprises can learn from the key enterprises.

The process should start from diagnosis and evaluation of the key enterprises to develop improvement plans, based on which financial assistance, technical guidance, and, if required, intermediary service to introduce a potential joint venture (or tie-up)

partner will be provided. Then, testing equipment and measuring instruments will be purchased (and shared) and standardization and quality control practices will be learned through actual experience.

It should be reemphasized, however, that the above initiatives will not produce much results unless concurrent efforts are made to upgrade engineering technology, another important element of quality capability. In this sense, promotion of standardization and quality control at key industries should be carried out as part of an overall project to modernize a factory.

The country seems to be pursuing the strategy of encouraging foreign direct investment and let individual enterprises learn modern engineering technology from foreign partners. However, foreign investment in the manufacturing sector concentrates of assembly of end products which are supplied to the domestic market or are manufactured for export purposes, whereas the manufacture of intermediate goods -- expected to play a critical role in promoting inter-linkage with local enterprises -- does not receive much attention because of the small market size. To foster this sector, therefore, special efforts are obviously required. The first step should focus on the metalworking subsector, particularly the foundry industry.

As for the recommended action, see Project #2 in Chapter 4.

4) Development of certification guideline for SMEs' quality system

Certification of the quality system based on ISO 9000 Series will increasingly become a business imperative for enterprises who primarily serve the export market and foreign companies operating in the country. In contrast, local enterprises mainly serving the domestic market are seldom required to obtain the advanced level of certification. The country is now moving toward the factory investigation system for assessment of product certification (particularly, mandatory and TCVN-based voluntary certification), but it is not realistic to demand every applicant to obtain the ISO 9000-based quality system without modification.

One realistic solution is to develop a guideline and promote a system following the guideline which can be followed by small- and medium-sized enterprises with reasonable efforts and produce tangible benefits. Such a guideline has already been published by the ISO secretariat. The accreditation body should show the guideline to the certification body, and the certification body develop a guidebook for reference by the applicants. In such way, the criteria applicable to SMEs may be defined and clarified.

At the same time, the government should fully commit itself to promoting the system by making the system a requirement for mandatory product certification[15], while giving incentives for the applicants by making the certificate a requirement for serving as a vendor to the government.

3.5 Testing and Inspection System

In the area of public service related to standardization and quality control, which is STAMEQ's responsibility, testing and inspection are expected to play two major roles. One is the inspection function required to operate related schemes including certification, and the other is the testing function to support industrialization and quality control activities on the industry side[16].

From the viewpoint of improving the industry's competitive strength, activation of the certification system is a critical factor, as discussed in 3.3.1. From the standpoint of the need for adaptation to the open economy, importance of the expanded scope of mandatory certification (3.3.2) and the internationally acceptable certification system (3.3.3) has been pointed out. To achieve each of the goals, an inspection system must be developed to cover required areas and provide the reliable results.

Development of a testing system is important also for industry to carry quality control. In this case, a system which can provide necessary testing service with proper timing is required.

The present testing and inspection system is not ready to meet future industry needs in terms of equipment, technology, and institutional framework.

3.5.1 Development of the testing and inspection system to reinforce the product certification system

(1) Major issues identified

Inspection required under the present product certification system is assumed to be conducted by an accredited laboratory or a laboratory designated by QUACERT. The latter means QUATEST. Inspection related to quality registration may be conducted by SMQ in provinces and designated cities, in addition to the above laboratories. Finally, inspection on export and import products is performed by QUATEST or an inspection organization designated by the government.

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[15] For the voluntary product certificate, the selection of quality system (this system or ISO 9000) be left for the applicant's option, while indicating with the certification mark as to which option was selected.

[16] As for research activities, basic research to develop standards should be included. At present, most of activities are related to verification on legal metrology.

Nevertheless, the scope of testing and inspection covered under the present requirements is fairly limited, and most equipment owned by the above organizations to conduct the required tests is old and obsolete.

Another issue related to the testing and inspection system is the absence of a testing laboratory which has been recognized under an internationally acceptable accreditation system. If the situation continues unchanged, the certification system will not be able to meet international standards.

Testing and inspection organizations involved in quality-related public service under STAMEQ's jurisdiction consist of (1) QUATEST(s) under STAMEQ; (2) SMQs in 61 provinces and designated cities (positioned as branches of STAMEQ); and (3) 58 laboratories accredited under the laboratory accreditation system (based on the previous accreditation scheme and consisting of laboratories of universities, private enterprises, and research institutes; no organization is accredited under the new scheme).

QUATEST is expected to become a core organization of the testing and inspection system. Basically it has equipment and instruments required for mandatory testing and inspection. Although it is capable of performing a standard set of tests related to food and water qualities, soils, cement, metal strength, and safety of electrical products subject to mandatory certification (fans, electric wires and cables), new testing equipment will be required if the scope of mandatory certification is expanded to other products.

SMQs in provinces and designated cities are organizations responsible for quality registration. Portions of inspection service under QUATEST's responsibility have been transferred to SMQ branches, and some are capable of conducting tests related to cement and safety of electrical equipment. Nevertheless, most of them commission tests to QUATEST and other testing organizations, and based on the test results, they provide inspection service. In fact, SMQ mainly conducts activities related to legal metrology.

Activities of the accredited testing organizations (under the old scheme), although not revealed in detail, are supposed to be capable of conducting testing and inspection on products subject to mandatory certification as well as testing service commissioned by the government.

Besides the above, there is an organization networking testing laboratories in the south, covering 262 laboratories in 13 testing fields. Also, there are private enterprises (including foreign companies) specialized in inspection service.

(2) Discussion

1) Positioning of QUATEST in the public testing and inspection system

In developing the overall concept of the future testing and inspection system, the

first step should focus on proper positioning of QUATEST.

In many industrialized countries, the testing and inspection system to maintain the accreditation system is operated in such way that the assessment body generally makes the final decision, while the results of testing and inspection by private organizations are utilized as far as possible to provide operational flexibility.

In Viet Nam, it is certain that demand for testing and inspection will grow and become diverse in keeping with industrial development, and at the same time, an increasing number of private enterprises will have or add their own testing equipment. In addition, the number of laboratories will increase as small- and medium-sized enterprises, who do not always afford to have their own equipment, will commission testing service to other enterprises.

On the other hand, it will become increasingly difficult for QUATEST and other public laboratories to handle every testing and inspection service for certification, as growth, diversification, and sophistication of the future certification demand will have the following impacts: (1) the need for large capital investment; (2) difficulty in meeting demand for technology transfer and human resource development; and (3) difficulty in keeping up with the progress of industrial technology all the time in terms of equipment and technology.

Positioning of QUATEST should be determined with consideration to the above factors.

2) Development of the laboratory accreditation system

In developing the laboratory accreditation system, two systems must be built up concurrently, one intended for certification covering the domestic market (TCVN-based voluntary and mandatory certification) and the other conducive to the internally acceptable certification system.

To use private testing and inspection organizations for testing service required under the certification system, many countries have designated such organizations on the basis of their own standards. This practice is still adopted widely.

This means, however, reliability of the entire certification system is somewhat governed by abilities of individual testing and inspection organizations. To secure universality in evaluation of such abilities, and more recently to assure transparency in the accreditation process, more and more countries adopt the accreditation system based on ISO/IEC Guide.

In Viet Nam, however, there are distinctively different needs for the certification system according to the type of enterprises: those which export their products or supply

to export industries and joint ventures; and those serving the domestic market only. The former requires certification by an organization acceptable to the customer, usually an internationally accepted organization. In the latter case, certification by an organization authorized in the country should suffice.

Thus, for the time being, while the final goal should be set to establish an internationally accepted certification system, the two-tier system needs to be promoted.

(3) Recommendation for the case in Viet Nam

1) Strategic direction

To produce the maximum result under resource constraints, the certification system must assume the effective use of existing organizations and facilities (including those to be established in future). Then, public organizations established to provide testing and inspection service required for certification are expected to assume the following functions: (1) supplementing the existing organizations; (2) provision of assistance and guidance for them; and (3) fulfillment of the roles which cannot rely on the existing organizations for the interest of fairness and neutrality.

To pursue the goal, the following strategic directions are recommended:

a) As for testing and inspection under the voluntary product certification system, testing equipment of applying enterprises will be used (see 3.3.1 for detail).

b) On the other hand, the applicant's equipment is not always usable for TCVN-based product certification and mandatory certification. In this case, testing equipment owned by private enterprises, universities, and research institutes will be used as shared resources. For this purpose, the accredited laboratories under the old accreditation system will be recognized as designated laboratories, while efforts will be made to maintain their technology levels. At the same time, examination criteria will be clearly defined to secure transparency of the accreditation process (in particular, in the case of testing and inspection service under mandatory certification).

c) To meet the needs for certification (including third party's certification) by enterprises which export their products and supply to export industries and joint ventures, an internationally acceptable laboratory accreditation system will be concurrently promoted.

2) Strategic direction for development of QUATEST's testing and inspection system

Strategic roles of QUATEST's testing and inspection system are basically defined as follows[17]:

1. To conduct tests and inspection, on a supplemental basis, which are required to build testing and certification capabilities for the certification system and which the designated laboratories of public enterprises and universities are unable to conduct;
2. To conduct tests as part of guidance to maintain and improve testing skills of the "designated" laboratories related to mandatory certification (comparison tests, etc.); and
3. To conduct forward-looking testing and inspection required to maintain an internationally acceptable certification system, i.e., the ability to serve as an international level, accredited laboratory and the ability to serve as the core accredited laboratory in the country.

In addition to the basic rules, it should be accepted that QUATEST will be able to provide other services, such as mandatory certification tests and inspection with relatively large demand and verification of equipment related to legal metrology, for the purpose of maintaining sustainable management of QUATEST, in consideration to actual trends in testing and inspection demand.

3) Building the laboratory accreditation system which is recognized by other countries

The current (new) laboratory accreditation system is assumed to become an internationally (mutually) recognized, which uses ISO/IEC Guide. In practice, however, sufficient experience has not been accumulated in an effort to move toward "mutual recognition" of test results on a multilateral or bilateral basis.

To ensure the success of mutual acceptance, there are two basic questions: (1) Do testing and inspection facilities in each country have equipment, manpower and procedures according to ISO/IEC Guide?, and (2) Can testing skills be reliable? It is therefore important to initiate efforts to build these foundations. Activities proposed for this purpose are summarized as follows:

a) Installation/upgrading of testing equipment and testing skills in the testing fields for major export products of Viet Nam for which needs for international mutual recognition is anticipated to increase

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[17] Note that the focal point of discussion here is the roles related to testing and inspection service conducted in connection with certification, and does not include the roles related to legal metrology, calibration, and other functions.

1. Procurement and upgrading of testing equipment
2. Building of testing skills, and comparison tests with other countries
3. Accreditation under an internationally reputed accreditation system in other country
4. Guidance for domestic testing organizations and facilities

b) Regional cooperation with ASEAN and other countries

1. Joint implementation of programs for learn and improve testing skills
2. Establishment and management of a joint laboratory accreditation organization

3.5.2 Development of the testing system to promote company standardization and quality control

(1) Major issues identified

Many enterprises (especially if they are not large) do not have their own testing equipment and often commission required tests to outside organizations, including those for mandatory inspection. The reliance on the third party organization, however, is not desirable for quality control purposes as it takes some time to obtain the test results, which cannot be used in time as the basis for actions to improve quality. To ensure proper quality control practice, a minimum required set of testing equipment and measuring instruments is essential.

At present, enterprises commission testing service to other organizations mainly for any of the following reasons: (1) To conduct the test requested by the customer or to obtain a third party's verification of the disputed product quality; (2) to conduct the test to voluntarily check quality of the enterprise's own product (including frequent cases of comparison tests at internal testing laboratories); and (3) to conduct the test to collect data for operational applications.

While public verification for the purpose of a third party's verification is mainly requested to QUATEST, other testing organizations are used for other tests, including universities, accredited testing organizations, and laboratories of large enterprises. Major reasons for using these organizations include the proximity to the factory, short time required for testing, flexibility in conducting the test for customer-specified items (the test based on standards in the case of QUATEST), and relatively low cost.

(2) Discussion

1) Testing service by public organizations

To effectively promote quality control throughout industry, public organizations

should own testing equipment which is too expensive to be owned by a single enterprise, and particularly by a small- or medium-sized enterprise, or which is not frequently used due to small demand and cannot be cost-justifiable for even a large enterprise, which will then be made available to nearby enterprises.

In principle, testing equipment required for quality control should be owned by each enterprise. In Viet Nam, however, most enterprises face difficulties in financing capital investment. As an increasing number of enterprises will own testing equipment and measuring instruments, particularly joint ventures and large enterprises, smaller enterprises located near them or having business relations with them will be able to have more opportunity to use them. Nevertheless, the equipment mentioned above will be difficult for many enterprises to use.

This equipment must be located near users and testing service using it must be provided to conduct requested tests and provide the results quickly. In the past, Japan had "technical support centers" providing such testing service, which were established in industrial areas by local governments and other organizations and were made available to small- and medium-sized enterprises. In the case of Viet Nam also, it is recommended to extend the testing facilities and equipment to the industrial zones in the future, though concentration of them in the central facility is inevitable at present because of lack of resources.

2) Testing equipment indispensable in quality control

Testing equipment and measuring instruments critical for quality control purposes may be classified into two categories: those required for in-process quality control and which must be owned by each enterprise; and those which can be left to outside testing service which must be near the factory to ensure quick availability of the test result.

The testing and measuring instruments required for the machinery and metal working subsectors can be categorized with the above classification. Most factories do not have even those required to be equipped in their factories. In the case of the electrical and electronic appliances subsector, however, the processes they have are limited to that of assembly, and require measuring instruments, which are used on the site. These equipment will not be useful if it is at the public laboratory. Rather, the public laboratories should be equipped with calibration equipment for these measuring instruments.

(3) Recommendation for the case in Viet Nam

To ensure performance of testing and inspection critical for quality control by using a limited number of equipment and instruments, it is recommended to develop and upgrade the testing and inspection system by a combination of the following two methods.

1) Deployment of testing equipment to QUATESTs

Testing equipment supporting quality control practice will be deployed to major industrial areas for use by nearby enterprises. Implementation organizations can be QUATEST, while equipment should be flexibly deployed, regardless of present locations of QUATEST, to provide easy access to potential users, i.e., the establishment of new branches in industrial estates as required. In addition, training will be provided for staff of these facilities to improve testing skills.

2) Accelerated procurement of testing equipment by core enterprises

As seen in the cement industry, a viable solution which is realistic for the country's economic conditions is to encourage large enterprises to procure necessary testing equipment and let it be shared by neighboring enterprises. As an incentive, the government will provide financial assistance for equipment purchase. At the same time, an official program will be launched to improve testing skills under the assistance of QUATEST, foreign enterprises and universities. Furthermore, tax incentives will be granted to enterprises who purchase testing equipment and provide testing service for others.

3.6 Industrial Metrology and Calibration

(1) Major issues identified

The present metrology and calibration system in the country contemplates that national metrology standards are maintained by VMI[18], based on which calibration and verification services are provided by QUATEST(s) and SMQ(s). In practice, however, the actual system is adjusted to reflect limited availability of equipment and geographical constraints between the north and the south, e.g., in the north, VMI owns working standards and provides verification and calibration services. Also, the metrology and calibration system in Viet Nam has developed with an emphasis on legal metrology, in line with the basic principle of quality-related public policy as discussed earlier.

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[18] Except for national standards related to radiation which are maintained by Center for Radiation Protection of INST (Institute of Nuclear Science and Technique), and calibration service in the same field which is responsibility of the center and Nuclear Research Institute, Da Lat City, which owns sub-standards.

1) Establishment of public measuring standards

VMI is responsible for the establishment of public measuring standards in the country. As for national standards, basic standards are mostly available to provide service meeting accuracy levels required by the industry in general and in the field of legal metrology, except for special areas.

At the same time, the following problems are surfacing:

a) Some of incidental equipment installed together with the measuring standards for use related to those standards are not sufficiently accurate, and equipment required to maintain measuring standards and accompanying equipment is not fully available, preventing the effective use of measuring standards.

b) An apparent delay is seen in the use of measuring instruments based on new technology or those of high accuracy level and large capacity. In particular, currently available instruments are not up to date in the context of the development of the oil industry as well as the electrical and electronic industry.

c) Recent industrialization makes it difficult to secure human resources in the field of metrology.

2) Supply of metrology standards

Organizations supplying metrology standards include VMI, QUATEST, SMQ in provinces and designated cities, and some large state enterprises. At present, there are various issues related to traceability, as follows:

a) As different metrology standard systems have evolved in the north and the south, at this time they are not entirely unified.

b) Some exceed the precision levels of VMI's national standards, making calibration impossible.

(2) Discussion

The improvement of the metrology and calibration system in Viet Nam needs to be addressed from two aspects; immediate issues and long-term issues.

In the long run, the system must be established as a unified and rational system which constitutes a social and economic institution and must be developed toward a system which addresses the future needs and goals. Such a system should contain the following elements:

a) Designation of national metrology standards that can cover a required range, or alternative standards

b) Development of the traceability capability to officially verify accuracy of

measuring instruments in relation to the above standards

Nevertheless, it is very difficult to establish national standards and other infrastructure which can cover every area demanded by industry and society in consideration of the funds, technology, and manpower required. In particular, in countries including Viet Nam, where there is a wide range of areas to be covered by metrology standards, yet there are relatively a few opportunities to use the system, it becomes a heavy burden on government or the public.

A viable alternative is to develop the system as a regional effort with neighboring countries, possible with cooperation of industrialized countries who have the well-developed systems in operation.

At the same time, immediate issues must be effectively addressed and dealt with, including the shortage of equipment, insufficient accuracy levels, issues related to maintenance of standards and calibration technology, and other issues to be faced in promotion of standardization and quality control.

In this conjunction, there are two important points which require particular attention. First of all, calibration does not present a practical problem as precision required in the Vietnamese industrial sector is still low. Rather, potential issues should be addressed, i.e., how to maintain high standards which are likely to be required with the progress of industrial development expected in near future, and the accompanying issue of building the calibration system.

Another point is that supply of lower-level measuring standards need not necessarily be carried out under the sole responsibility of public organizations. The result of the enterprise survey indicates that calibration service is entirely commissioned to organizations under STAMEQ, suggesting the absence of other qualified organizations. In future, an alternative system should be considered to expand service availability, such as the formation of a calibration service network by accrediting qualified organizations such as research institutes, private enterprises, and universities.

(3) Recommendation for the case in Viet Nam

1) Urgent and immediate issues

The following actions related to provision of metrology standards are considered to be urgent and immediate issues to be dealt with (Table 3-3):

a) Mass standards: Measurement standards in the area of mass are frequently used. The existing E_1 class standards, however, are low in accuracy in terms of international level, and their measuring area of coverage are limited. Further, the

accuracy of the balance used for calibration is unsatisfactory, resulting in difficulty in displaying accuracy of E_1 class. The unsatisfactory accuracy level of the balance is a serious problem.

b) Electrical standards: The existing national standard can output only a single value, making it unsuitable for practical use. At the same time, the measuring instruments used by the industry are not calibrated locally, since almost no calibration facility is available in this technical field. Further, it would be difficult to meet the needs of calibration if the certification system is expanded in the field of electrical safety.

c) Flow standards: Flow standards are frequently used in verification of measuring instruments related to legal metrology, including water meters, and petroleum trade. However, here there is a shortage of standards for calibration of large capacity flow meters used in the petroleum industry, resulting in a serious problem of significant error in transactions. Further, the standards for calibration of gas flow meters, which are not available at present, will be increasingly needed in future.

In particular, scales for mass-related calibration as well as general electricity standards at high precision levels must be acquired by VMI, with necessary calibration equipment to be provided in QUATEST 3.

As for equipment at VMI, at least temperature and humidity control systems in (1) length standards lab ($80m^2$), (2) capacity standards lab ($80m^2$), and (3) electricity standards lab ($80m^2$) need to be improved.

Further, the following recommendations are made in the area of organizational structure and institutional setup:

a) Organizations responsible for establishing and maintaining national metrology standards and their reference standards, and those providing calibration service for secondary standards by using national and reference standards should be clearly (and exclusively) designated by law, with clear indication of designation criteria (public interest, and assurance of fair service)

b) Organizations to provide calibration service for working standards and testing and measuring instruments at enterprises and laboratories by using secondary standards calibrated above should be accredited by STAMEQ's director general or MOSTE's ministry for the purpose of ensuring reliability of their service. Certification standards are clearly defined to encourage participation of public enterprises, research institutes, and universities.

c) Designation and accreditation standards for the above organizations should be based on the applicable ISO/IEC Guide. Equipment owned by these organizations will be subject to mandatory, periodic calibration based on higher standards, and calibrated equipment should be affixed with certificate.

d) Basically, VMI and INST are responsible for activities in (a), while those in (b) are made by VMI (QUATEST 3 in South) and power companies in the area of industrial metrology, and QUATEST and SMQs in provinces and designated cities in the area of commercial metrology. In practice, however, this division of responsibility is not strictly followed, e.g., in some areas, VMI owns working standards and competes in providing verification service due to equipment and manpower. Although the above institutional setups need to be clearly established legally. Nevertheless, present duplication and conflict of some functions, in a sense, would be a practical solution to prevent scattering of equipment and manpower in consideration to the need for operation of the system under resource constraints.

e) To train personnel with skills in maintenance of standards and calibration technology, training opportunities provided by foreign organizations must be relied on for the time being. In future, an indigenous training system needs to be developed, possibly under international or regional (e.g., ASEAN) cooperation.

2) Long-term development

In the long run, rather than having all the advanced standards in Viet Nam alone as well as the calibration system, a realistic approach is either (1) to own and maintain them jointly by ASEAN countries, or (2) to use advanced metrology standards in foreign countries, which are readily available, as the first step, and to gradually build up secondary or reference standards according to the degree of need.

As for joint efforts by ASEAN countries, each country may maintain basic standards which are frequently used, while sharing advanced standards by having several of them in each country without duplication.

Further, the environment in which VMI maintains and manages the national standards has various problems to be improved from the long-term perspective. In particular, national standards must be maintained under strict temperature and humidity control, while avoiding physical disturbance such as vibration from nearby facilities. VMI's location in Nghia Do is optimum for this purpose as MOSTE's research facilities are concentrated in the area. In future, when more advanced scientific and engineering facilities are constructed (e.g., a high-tech park, which is currently under study), a facility must be specially designed to maintain national standards in due

consideration to ground, building, and temperature and humidity control. As national standards are not frequently used for calibration purposes, their locations do not necessarily consider accessibility for users. Instead, an emphasis should be placed on their maintenance and management.

Table 3-1 Detail of Criteria and Procedure prepared by Accreditation Body

EMS	M-1	RE 100	Acceptance Criteria	ISO/IEC Guide 62
		RE 200	Acceptance Procedure	ISO/IEC Guide 61
		RE 300	Guideline for RE 100	IAF Guidance on ISO/IEC Guide 62
	M-2	TE 100	Acceptance Criteria	ISO/IEC Guide 62 and IATCA Rules
		TE 200	Acceptance Procedure	ISO/IEC Guide 61
		TE 300	Guideline for TE 100	ISO/IEC Guide 62 and IATCA Rules
		TE 101	Training Course Guide	ISO 14012 and IATCA Rules
	M-3	CE 100	Acceptance Criteria	EN 45013
		CE 200	Acceptance Procedure	ISO/IEC Guide 61
		CE 300	Guideline for CE 100	EN 45013
Quality System	M-4	R 100	Acceptance Criteria	ISO/IEC Guide 62
		R 200	Acceptance Procedure	ISO/IEC Guide 61
		R 300	Guideline for R 100	IAF Guidance on ISO/IEC Guide 62
	M-5	T 100	Acceptance Criteria	ISO/IEC Guide 62
		T 200	Acceptance Procedure	ISO/IEC Guide 61
		T 300	Guideline for T 100	IAF Guidance on ISO/IEC Guide 61
		T 101	Training Course Guide	IRCA Rule (and IATCA Rules in Future)
	M-6	C 100	Acceptance Criteria	EN 45013
		C 200	Acceptance Procedure	ISO/IEC Guide 61
		C 300	Guideline for C 100	EN 45013
Product Conformity	M-7	P 100	Acceptance Criteria	ISO/IEC Guide 65
		P 200	Acceptance Procedure	ISO/IEC Guide 61
		P 300	Guideline for P 100	ISO/IEC Guide 65
Inspection Body	M-8	I 100	Acceptance Criteria	ISO/IEC Guide 39
		I 200	Acceptance Procedure	ISO/IEC Guide 39
		I 300	Guideline for I 100	ISO/IEC Guide 39
		I 400	Specifications for Each Area	
Certification and Testing Laboratory	M-9	RL 100	Accreditation Criteria	ISO/IEC Guide 25
		RL 200	Accreditation Procedure	ISO/IEC Guide 58
		RL 300	Guideline for RL 100	ISO/IEC Guide 25
		RL 400	Specifications for Each Area	

Notes: IAF = International Accreditation Forum
IRCA = International Registor of Certified Auditor
IRCA Rule = Registration Criteria for the Auditing Skills Training Course
IATCA = International Auditor Training & Certification Association (Secretariat: JAS-ANZ, Noel Mathews)
ILAC = International Laboratory Accreditation Cooperation

Table 3-2: Estimate of Required Number of Assessors/Auditors for Certification & Accreditation

	1997 (Actual)	2000	2005
· Number of industrial establishments (State Company only) *1)	2,002 *11)	2,600	3,300
· Projected number of certification/accreditation applicants			
(1) Voluntary product certification			
1) TCVN conformity certification *2)	48	65	80
2) Transfer from Quality Registration *3)	-	80	80
3) Foreign standards conformity certification *4)	0	0	20
(2) Mandatory certification *5)	112	250	310
(3) ISO 9000 quality system certification *6)	6 *12)	60	150
(4) Laboratory accreditation *7)	3	25	60
· Estimate of required number of qualified auditors *8)			
1) Auditors in certification (registration) bodies		33	46
2) Instructors in auditor training bodies *9)		3	3
3) Accreditation auditors in accreditation body		2	5
4) Internal auditors at enterprises *10)		30	75
計		68	129

Notes: *1) See Table 1-1.

*2) The same increase rate of *3 was applied.

*3) Assuming 80 factories out of 800 registered factories will apply for the certificate.

*4) Agreement with 2 systems with 10 companies for each system (Table 4-14).

*5) 112 existing certified manufacturers. For additional manufacturers, see Table 4-11.

*6) According to the questionnaire survey, the companies interested in ISO 9000 was 18%. Using this figure, the number of companies to apply for ISO 9000 in the near future was estimated 150, assuming that 1/4 of them will actually apply by 2005.

*7) 30 laboratories in STAMEQ and 30 other laboratories.

*8) Auditors are assumed those who are qualified by ISO/IEC Guides, excluding that of candidate auditors. No double assignment is assumed among auditors in different bodies. Auditors are assumed to undertake assessment in any technological fields. However, for this aim, nurturing of experts is necessary for each technological fields of importance. One auditor is assumed to be able to carry out 14 assessments a year.

*9) Assumed 3 persons.

*10) 0.5 persons/organization (or company), for those applied to ISO 9000 quality system certificate.

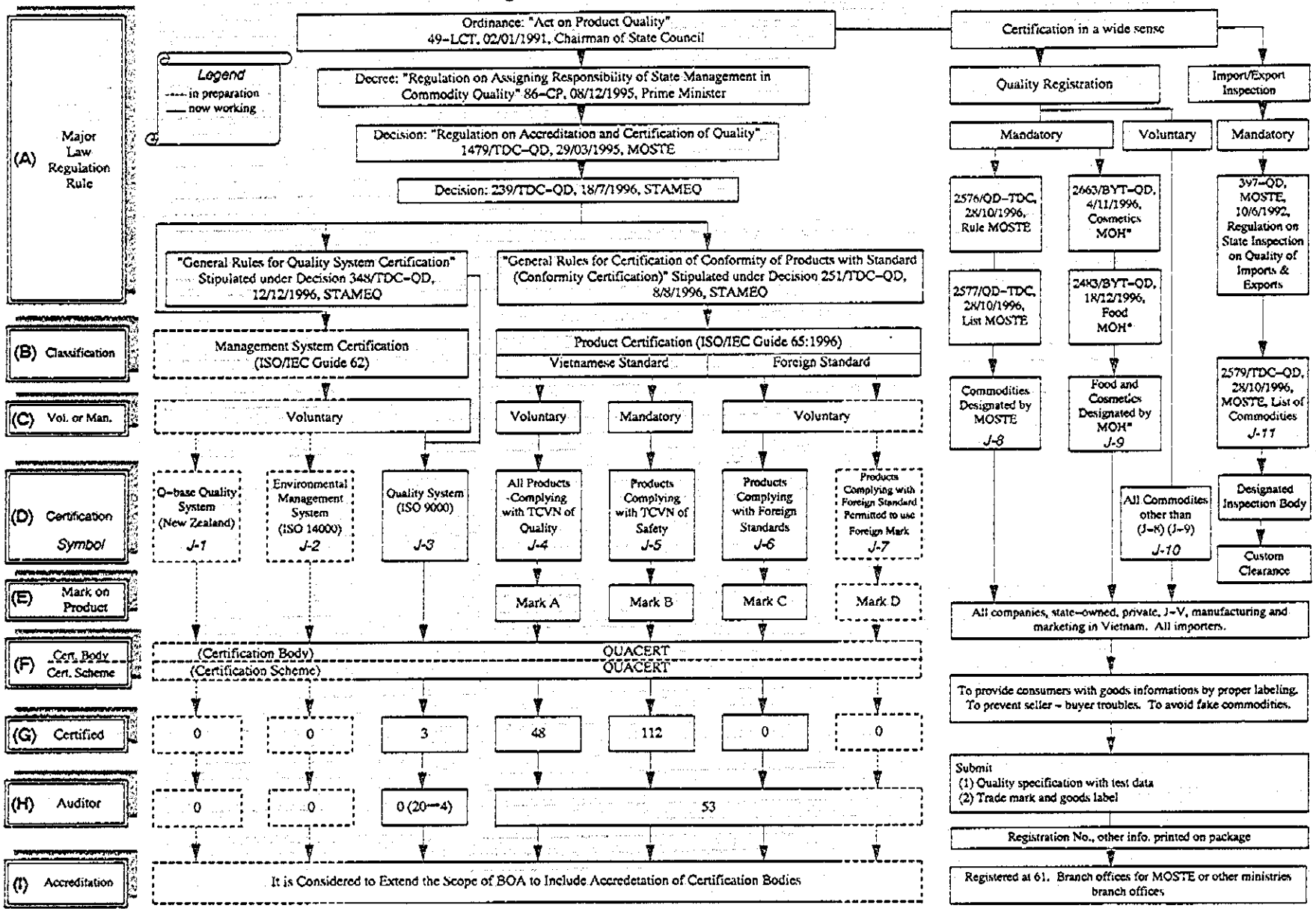
*11) In 1995.

*12) Of which three are certified by certification body abroad.

Table 3-3 List of Required Measuring Standards and Calibration/Verification Equipment (Project #5)

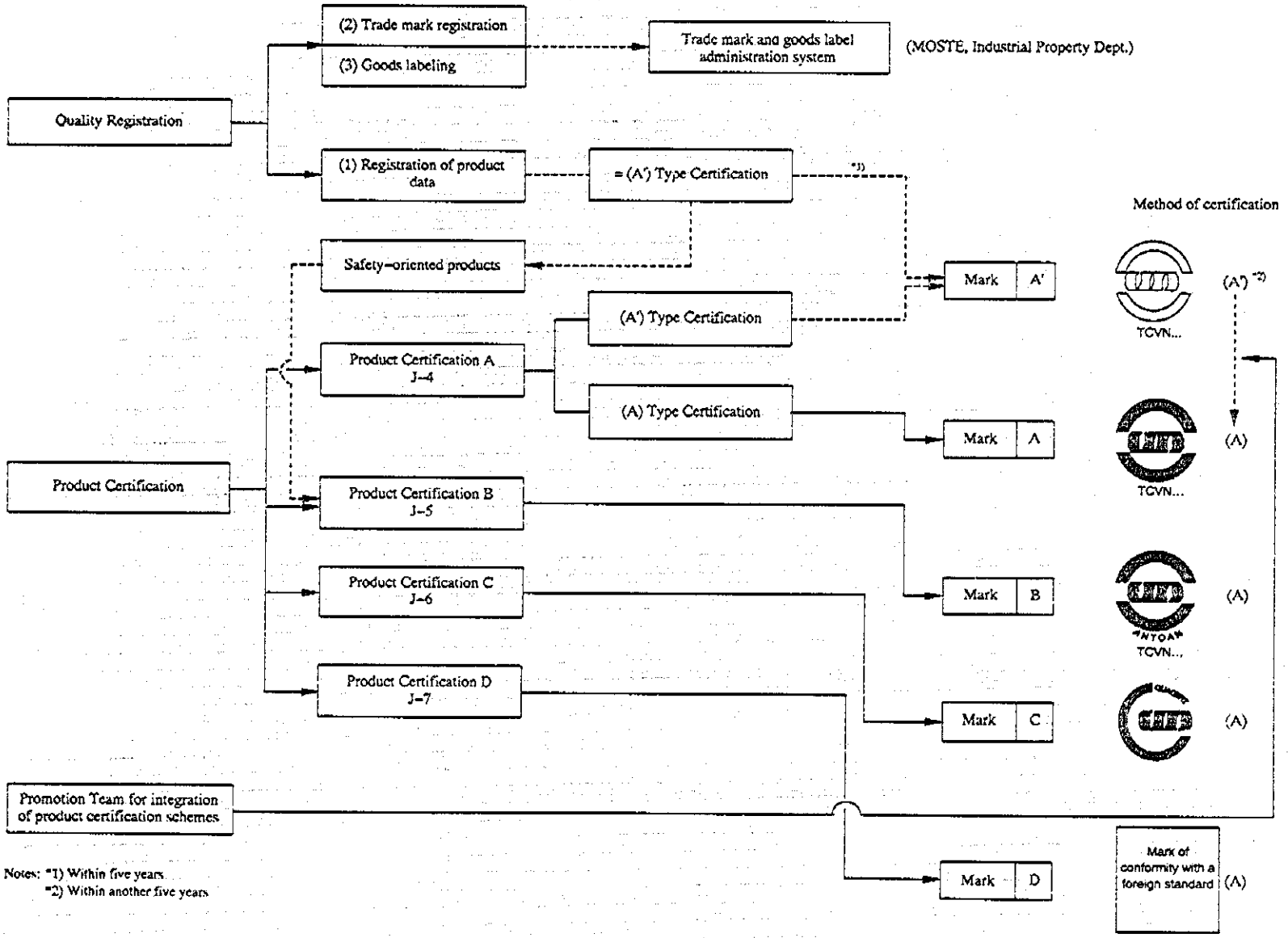
	Standard/Equipment	Measuring Range	Uncertainty/ Accuracy
Mass Measurement	1) Comparator balance (1kg)	1kg	$R < 5.10^{-9}$
	2) National Mass Standard (1kg)	1kg	$u \leq 2.10^{-8}$
	3) Weight sets (E1)	1mg – 20kg	E1
	Estimated cost (US$):		140,000
Flow and Volume Measurement	4) Master flow meter for water	15mm, 20mm, 25mm 50mm and 100mm diameter	0.1%
	5) Master flow meter for mineral oil, displacement type	100mm diameter	0.5 – 0.2%
	6) Master flow meter for gas	100mm diameter	0.1%
	Estimated cost (US$):		120,000
Electrical Measurement	7) DC reference standard	0 – 10V	±0.3PPM
	8) Reference divider 2units	1Ω	±2PPM
		10Ω	±2PPM
	9) Multifunction calibrator	0 – 1,100V	±3.25PPM
		0 – 2.2A	
	10) Source signal device	10MHz – 20GHz	1.10^{-9}
	Estimated cost (US$):		130,000
Electromagnetic Measurement	11) Spectrum analyzer	10MHz – 20GHz	0.1 – 0.5%
	Estimated cost (US$):		80,000

Figure 3-1 Certification System in Viet Nam



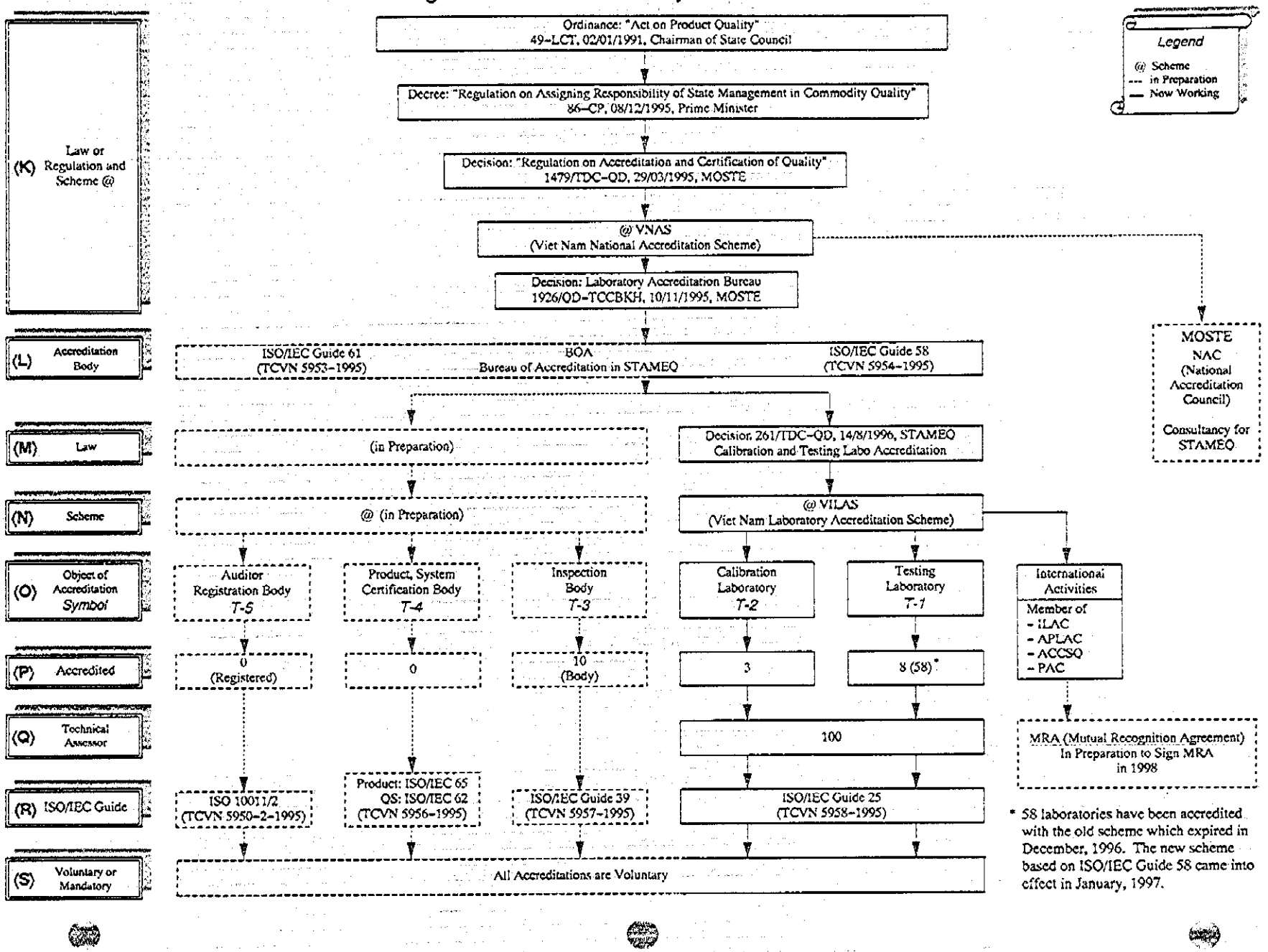
Note: * MOH, Ministry of Health

Figure 3-2 Program for Integrating Product Certification Schemes



Notes: *1) Within five years
*2) Within another five years

Figure 3-3 Accreditation System in Viet Nam



* 58 laboratories have been accredited with the old scheme which expired in December, 1996. The new scheme based on ISO/IEC Guide 58 came into effect in January, 1997.

Figure 3-4 Model of Accreditation and Certification Systems for Mutual Recognition