Working paper

Role of standards

A guide for small and medium-sized enterprises

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna, 2006

This publication is one of a series of guides resulting from the work of the United Nations Industrial Development Organization (UNIDO) under its project entitled "Market access and trade facilitation support for South Asian least developed countries, through strengthening institutional and national capacities related to standards, metrology, testing and quality" (US/RAS/03/043 and TF/RAS/03/001). It is based on the work of UNIDO consultant S. C. Arora.

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PREFACE

In the globalized marketplace following the creation of the World Trade Organization, a key challenge facing developing countries is a lack of national capacity to overcome technical barriers to trade and to comply with the requirements of agreements on sanitary and phytosanitary conditions, which are now basic prerequisites for market access embedded in the global trading system. The World Trade Organization has adopted two important agreements in these areas: the Agreement on Technical Barriers to Trade and the Agreement on Sanitary and Phytosanitary Measures (both available at http://www.wto.org). With a view to meeting this challenge, developing countries need significant technical assistance to develop institutional infrastructure related to standards, metrology, testing and quality in order to be an able partner in the global trade regime.

With a view to developing national capacity among the South Asian least developed countries, the United Nations Industrial Development Organization (UNIDO) has implemented a project entitled "*Market access and trade facilitation support for South Asian least developed countries, through strengthening institutional and national capacities related to standards, metrology, testing and quality*". The project was financed by the Government of India and the Norwegian Agency for Development Cooperation.

To facilitate understanding of the complex subject of standards, metrology, testing and quality, a number of small guides, as listed below, have been developed as part of the project. These guides are available free of charge to small and medium-sized enterprises and other interested users.

Role of standards

Product quality

Role of measurement and calibration in the manufacture of products for the global market

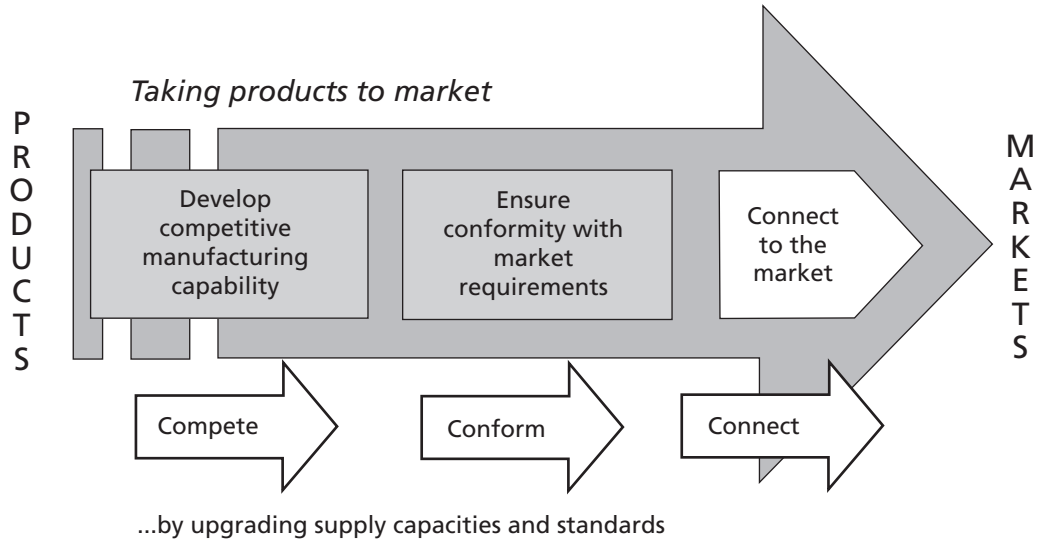
The purpose of the present guide is to assist small and medium-sized enterprises and other interested users to understand how to control product quality. Chapters 5-8 of the guide also cover various third-party schemes for product certification and pre-shipment inspection and also how the World Trade Organization Agreement on Technical Barriers to Trade can facilitate product conformity assessment procedures.

UNIDO 3Cs approach addressing developing country concerns

A strategic response:

UNIDO has developed a strategic approach to help developing countries to overcome trade participation constraints and to achieve a palpable increase in exports:

- COMPETE: removing supply-side constraints and developing competitive manufacturing capability
- CONFORM: developing and ensuring product conformity with technical and market requirements
- CONNECT: enhancing integration with and connectivity to markets



COMPETITIVENESS: activities under this heading are oriented towards the removal of supply-side constraints, the promotion of the manufacture of products with high export potential and the provision of assistance related to:

- **Developing productive capacities**
  - Developing a conducive policy environment for investment and private sector development
  - Identifying key export areas facing supply-side constraints and value chain analysis
  - Upgrading industrial structures and mechanisms for value addition
  - Advising on product design, technology, upgrading and quality control
  - Establishing technology support institutions to improve technology acquisition
  - Improving business efficiency and performance, especially quality management
  - Introducing energy-saving, cleaner technologies, minimizing waste and utilizing by-products

- **Enhancing capacity to meet international standards and client quality and safety requirements**
  - Introducing a legal framework for consumer protection
  - Ensuring access to requirements via WTO enquiry points
  - Advising on food safety requirements, HACCP, TBT/SPS requirements, ISO 9001/14001
  - Ensuring compliance with labelling and packaging requirements
  - Introducing SME subcontracting and partnership exchanges

CONFORMITY: activities under this heading are oriented towards promoting conformity with market requirements and securing a larger share in export markets, focusing on:

- **Upgrading conformity assessment infrastructure**
  - Establishing the requisite legal and regulatory framework for conformity
  - Establishing recognized standards, accreditation, certification and inspection schemes
  - Developing internationally recognized and harmonized conformity structures
  - Upgrading laboratories and supporting international accreditation
  - Establishing international calibration chains for measurement and precision manufacture

- **Creating an environment conducive to export promotion**
  - Creating an enabling environment for foreign direct investment
  - Establishing national investment promotion agencies
  - Developing export support policy and export promotion infrastructure
  - Introducing export support services and trade information services
  - Linking to global supply chains and export consortia and cluster development

CONNECTIVITY: activities under this heading are carried out in cooperation with other agencies and oriented towards supporting developing countries in their efforts to acquire the technological and institutional capacities they need to implement WTO agreements and participate fully in the new rules-based trading system. The focus is on:

- **Integrating with the international trade framework and rules**
  - Sensitizing developing countries to WTO rules and facilitating WTO accession
  - Enhancing negotiating capacities and promoting policies for the settlement of disputes
  - Adhering to notification requirements

- **Harmonizing customs procedures and transport mechanisms**
  - Improving port and harbour operations and handling procedures
  - Streamlining registration and documentation requirements
  - Improving pre-shipment inspection and facilitating customs clearance

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OCCASION

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market conditions, which prevailed for some time after the Second World War, put consumer interest in jeopardy. To safeguard this interest and to meet the rising demand for standards for finished products, standardization activities increased in various countries, with the additional support and involvement of government and industry.

With increased trade among industrialized countries, internationally accepted norms or standards were needed to support this development. This led to the establishment of international bodies for standardization, such as the International Electrotechnical Commission (IEC) in 1906 and the International Organization for Standardization (ISO) in 1947.

Following the colonial era in Asia and Africa and accessorily in Latin America, factors such as excess demand over supply, low purchasing power and problems with adherence to foreign standards led to the establishment of NSBs. In developing countries and in those countries that had recently gained their independence, the aim of these standards bodies was to formulate national standards to suit local technologies, materials and consumption patterns. Organized standardization has now become an important element of infrastructure needed for the healthy growth of industry and commerce in all countries of the world.

Aims of standardization

Standards and standardization

- A standard is a document which provides, inter alia, requirements, rules, and guidelines, for a process, product or service. These requirements are sometimes complemented by a description of the process, products or services.
- Standards are the result of a consensus and are approved by a recognized body.
- Standards aim at achieving the optimum degree of order in a given context.
- The process of formulating, issuing and implementing standards is called standardization.

Following are the primary aims of standardization:

Fitness for purpose

Fitness for purpose is the ability of the process, product or service to fulfil a defined purpose under specific conditions. Any product, process or service is intended to meet the needs of the user. Sometimes the expectations of the users may be at variance with the actual purpose. In addition, it is difficult for the users to always spell out the desirable quality of the process, product or service. Standards help by identifying the optimum parameters for the performance of a process, product or service (e.g. product standards) and the method for evaluating product conformity (such as test method standards and quality control standards). Standards also lay down conditions for using the process, product or service, as otherwise any failure of the

process, product or service due to improper use may be attributed by the users to a deficiency or lack of quality of the process, product or service.

Interchangeability

The suitability for a process, product or service to be used in place of another to fulfil a relevant requirement is called *interchangeability*. Through a deliberate standardization process, it is possible to make processes, products or services interchangeable, even if they are created in different countries. For example, shaving blades of different brands may be designed to be used in the same razor, injection needles of different sizes and brands may be designed to fit the same hypodermic syringe.

Variety reduction

It is popularly believed that variety is the spice of life. While a large number of varieties for a particular process, product or service may be helpful to consumers and enable them to select the most appropriate, this large number of varieties requires large inventories, resulting in high costs to manufacturers. *Variety reduction* is one of the aims of standardization for the selection, inter alia, of the optimum number of sizes, ratings, grades, compositions and practices to meet prevailing needs. Balancing between too many and too few varieties is in the best interest of both manufacturers and consumers.

Compatibility

Parallel developments of processes, products or services, which are required to be used in combination, pose problems if they are not compatible. One of the aims of standardization is *compatibility*, namely, suitability of processes, products or services to be used together under specific conditions to fulfil the relevant requirements, without causing unnecessary interaction. For example in electronic data processing, information has to be coded for storage, transmission and retrieval in the form of electronic pulses. To make the code recognizable for any machine and all times, it has to be standardized. Such standardization helps to establish compatibility between various machines or subsystems and permits expansion features and information exchange amongst different systems.

Guarding against factors that affect the health and safety of consumers

Safety of the process, product or service is of great importance if, under certain conditions, the use of the process, product or service may pose a threat to human life or property. Therefore, identification of processes, products or services and their safety parameters, *not only under normal use but under possible misuse*, is one of the important requirements of standardization. For example, items for human consumption should be free from poisonous substances: if food colours are used in candy or sweets, they should be free from poisonous substances like lead or arsenic. If an electrical appliance is manufactured, it should be well insulated to be free from electrical hazards: electric irons, for example, should be designed so as to guard their user against electrical shock from any part of the iron. Safety standards

also broadly cover the requirements to ensure the safety of equipment (e.g. a dust-proof enclosure for equipment) and that of people and the environment (e.g. flame-proof enclosures for equipment used in mines).

Environmental protection

Environmental protection is an important aim of standardization: the focus here is on preserving nature from damage that may be caused during the manufacture of a product or during its use or disposal after use. For example, the domestic use of a washing machine should generate only a minimum of pollutants.

Better utilization of resources

Achievement of maximum overall economy through *better utilization of resources* such as capital, human effort and materials is an important aim of standardization. In manufacturing organizations, it is this aspect of standardization of materials, components and production methods that makes it possible to reduce waste and to carry out mass production in an economic way. For example, in construction and civil engineering, the use of the appropriate quantities of cement and steel to achieve a required strength are recommended in building standards and codes of practices.

Better communication and understanding

Whenever the transfer of goods and services is involved, standards spell out what means of communication are to be used between different parties. Since standards contain information that is recorded in a precise and documented form, they contribute towards *better communication and understanding* in a large variety of settings. In public places such as airports, railway stations and highways for instance, standardized signs play an important role.

Transfer of technology

Standards act as a good vehicle for technology transfer. Since standards incorporate the results of advances in science, technology and experience, they reflect the state of the art in technical development. As standardization is a dynamic process, standards are updated as new technologies are developed.

Removal of trade barriers

Restrictions on the export of processes, products or services by the introduction of some technical barriers to trade, such as arbitrary product requirements, are being viewed with great concern. *Standards prevent such non-tariff barriers to trade* by harmonizing requirements in a manner that promotes fair competition. Purchasers can be convinced about the quality level of a product that has been manufactured according to a recognized standard.

Benefits of standardization

By its very definition, standardization is aimed at achieving maximum overall economy. Standards provide benefits to different sectors of society. Some of the benefits of standardization are as follows:

- **For manufacturers, standards:**

  Rationalize the manufacturing process.

  Eliminate or reduce wasteful material or labour.

  Reduce inventories of both raw material and finished products.

  Reduce the cost of manufacture.

- **For customers, standards:**

  Assure the quality of goods purchased and services received.

  Provide better value for money.

  Are convenient for settling disputes, if any, with suppliers.

- **For traders, standards:**

  Provide a workable basis for acceptance or rejection of goods or consequential disputes, if any.

  Minimize delays, correspondence, etc., resulting from inaccurate or incomplete specification of materials or products.

- **For technologists, standards:**

  Provide starting points for research and development for further improvement of goods and services.

Attributes of a standard

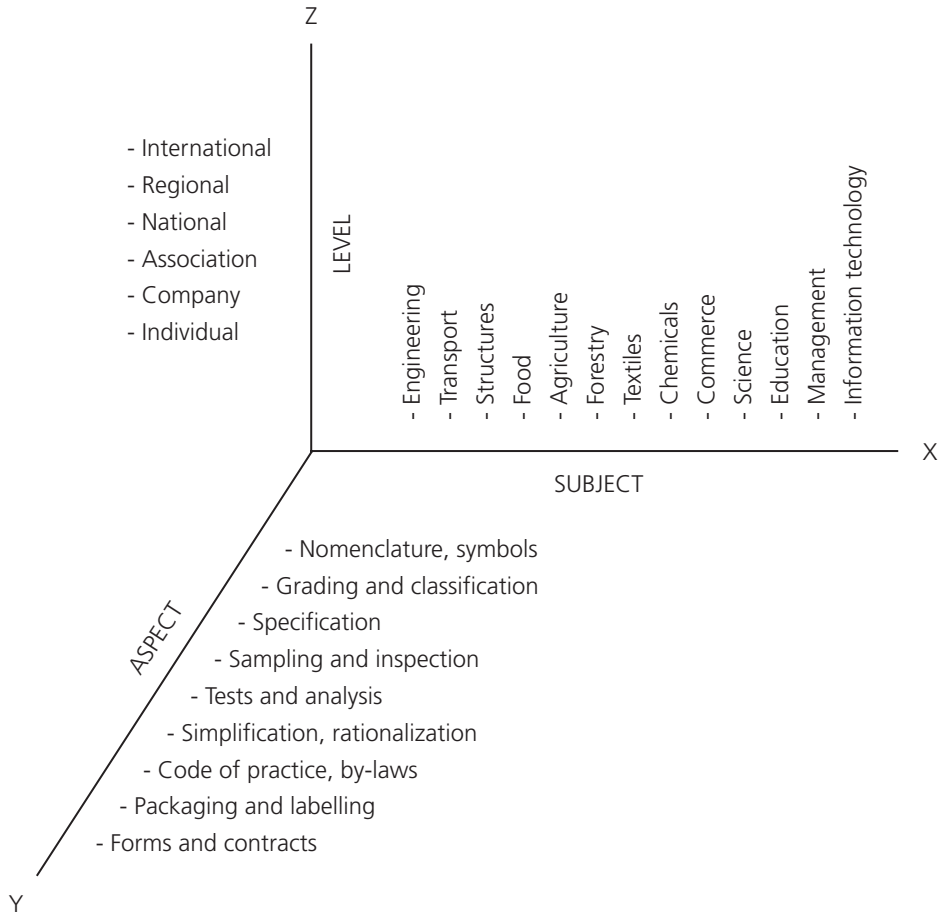
A standard generally has three attributes:

- *Level*: such as at the company, national or international level.
- *Subject*: such as engineering, food, textile or management.
- *Aspect*: such as specification, testing and analysis, packaging and labelling (more than one aspect may be covered in a single standard: a standard may include specification of items such as the product, its sampling and inspection, related tests and analysis, packaging and labelling).

For example the term “Indian Standard Specification of Biscuits”, means that the standard is a national standard (level), in the food area (subject), and provides specifications

(aspect) for the biscuits. Figure I shows a standardization diagram that refers to the level, subject and aspects of standards, which was created by Dr. Lal C. Verman, founder and Director General of the Bureau of Indian Standards, the national standards body of India.

Figure I. Standardization diagram



2 COMPANY AND INDUSTRY STANDARDIZATION

Standardization can be undertaken at four significant levels. These are at the international, national, association (or industry) and company levels. Chapter 3 covers standardization at the national level and chapter 4 explains standardization at the international level. The present chapter briefly explains company and industry level standardization.

Company standardization

Company standardization includes all those activities that are aimed at streamlining, coordinating, and documenting generally accepted information (or procedures). Company standardization may deal with engineering standards, production standards, administrative and financial norms, codes of practice for manufacturing and maintenance, and even codes for conducting activities such as market surveys and cost estimates. Standardization provides a company with the means for the simplification and rationalization of its operations.

Company standardization should be understood in its wider sense to cover all sorts of enterprises, including, inter alia, government departments, project authorities, institutions and municipalities. In other words, company standardization may be called "enterprise standardization" that covers large, medium, small, private, official or semi-official organizations.

Procedures for company standardization

The procedures followed for preparing company standards differ widely from firm to firm, but one feature that is essential to ensure the effectiveness of standards is common to all: all standards stem from a consensus between all parties who refer to and use standards in their daily work. In formulating company standards, any one of three methods, namely (*a*) the committee method, (*b*) the consultative method or (*c*) a combination of both, can be used. Once they have been prepared, company standards are mandatory for implementation within the company.

Benefits of company standardization

The benefits of company standardization include:

- Company standards provide the best possible solutions that can be applied to recurring problems. In this way, a waste of time and energy is avoided, as well as resorting to ad hoc solutions for the same problems;

- Company standardization can also control the growing varieties of tools, materials, components and products that are used by the company, and thus achieve maximum overall economy;
- Today in any company, there is a fair amount of labour turnover. The experience gained by the company over a period of time should not be lost because of this. Company standards prevent this drain of valuable experience by documenting it in the form of company standards. In this way, experience always remains within the company;

As a policy, company standards should adopt national standards whenever these are available. Companies should resort to formulating their own standards only when national or international standards are not available.

Industry or association level standardization

Beyond the company level, standardization efforts are also carried out at the level of the industry or of professional associations. This represents the collective standardization activity of groups of companies and other enterprises that focus on a given industry or trade. It also includes the standardization activities of certain professional bodies, such as engineers and societies that are concerned with the advancement of science and technology.

Industry level standardization serves to integrate company standards and unify them in the interest of the industry as a whole. Industry level standards also serve as a basis for overall integration at the national level. In advanced countries such as the United States, standardization at the industrial level is highly developed. There are about 500 associations, professional bodies and governmental agencies that have issued and continue to issue thousands of industry level standards in a large number of fields. For example, organizations such as the ASTM, the American Petroleum Institute (API) and the ASME issue industry level standards. In this regard, industrial associations and professional bodies play a very significant role in the standardization movement in the United States. However, while industrial associations are important in this process in the United States, standardization activity at the national level is limited in this country. In other advanced countries, the balance between industry level and national level standards is well maintained. In developing countries, standardization activity is mainly centred on the NSBs. These NSBs encourage the advancement of industry level and company level standardization.

3 NATIONAL STANDARDS

Amongst the various levels of standardization, i.e. the level of the individual, the company, the industry or the country, it is the national level that is most important. It is at the national level that the standardization requirements of individuals, companies and the industry are coordinated and integrated into purposeful national standards. At the same time, national level standards serve as a basis for forging international agreements on international standards, which help to promote worldwide exchanges of goods and services.

National standards bodies

At the national level, the work of preparing and issuing standards is carried out by NSBs. In some countries, NSBs are called "institutions" or "institutes" (e.g. Sri Lanka Standards Institution, British Standards Institute) and in others "associations" (e.g. Standards Association of Zimbabwe) or "bureaus" (Bureau of Indian Standards). In some countries a department or an agency of the government is responsible for this work. Most of the NSBs around the world are members of the ISO; in some countries that do not have NSBs, provisions exist for a correspondent membership status with the ISO. At present, 148 countries are members of the ISO.

Fifteen NSBs were established between 1917 and 1925, mostly in developed countries. Germany was the first to establish an NSB, followed, inter alia, by the United Kingdom of Great Britain and Northern Ireland, the United States, Belgium, Canada, Netherlands, Switzerland and Austria. In developing countries, NSBs were launched first in Brazil (1940), then, inter alia, in India (1947), the Philippines (1947), Pakistan (1951), Myanmar (1956), Iran (1960) and Sri Lanka (1964). Currently, 60 per cent of the members of ISO are developing countries.

The main functions of NSBs include:

- Preparation and promulgation of national standards;
- Promotion of the implementation of standards by industry;
- Certification of products;
- Provision of information on standards and related technical matters, with regard to both national and international standards;
- Country representation in international activities and at forums that deal with standards.

Broadly speaking, an NSB usually consists of two main structures, the directorate and the committee department. The responsibilities of the directorate, or secretariat, include chiefly the administration of the affairs of the NSB and serving the various committees. These tasks include publishing and organizing the sale of standards and other publications.

The committee and council department of an NSB comprises a policymaking body called the general council or general body and several division councils or industry committees that are each responsible for fairly large industrial sectors. The division councils or industry committees determine the technical policies and programmes of standardization for their own sector of industry. The division councils are made up of representatives of industry, trade and other organizations that have an interest in the standardization process.

The division councils or industry committees appoint sectional or technical committees to undertake the actual preparation of standards in specific fields. The knowledge and experience of interest groups such as manufacturers, users, government departments and universities is pooled in these committees. In turn, these committees may create working groups or subcommittees for in-depth studies and investigations on specific aspects of problems encountered in the development of standards and for preparing draft standards.

Development of national standards

The principles that underlie the preparation of national standards include:

- National standards shall fulfil the generally recognized needs of industry, trade, technology and other sectors of national life;
- They shall safeguard the interests of both the producer and the consumer;
- They shall represent the largest possible national consensus of opinion between all the interests concerned;
- They shall be aimed at maximum overall economy through better utilization of national resources;
- They shall be subject to periodic revision and amendment and be kept up to date to reflect the latest advances in technology and the progressively changing conditions of the national economy.

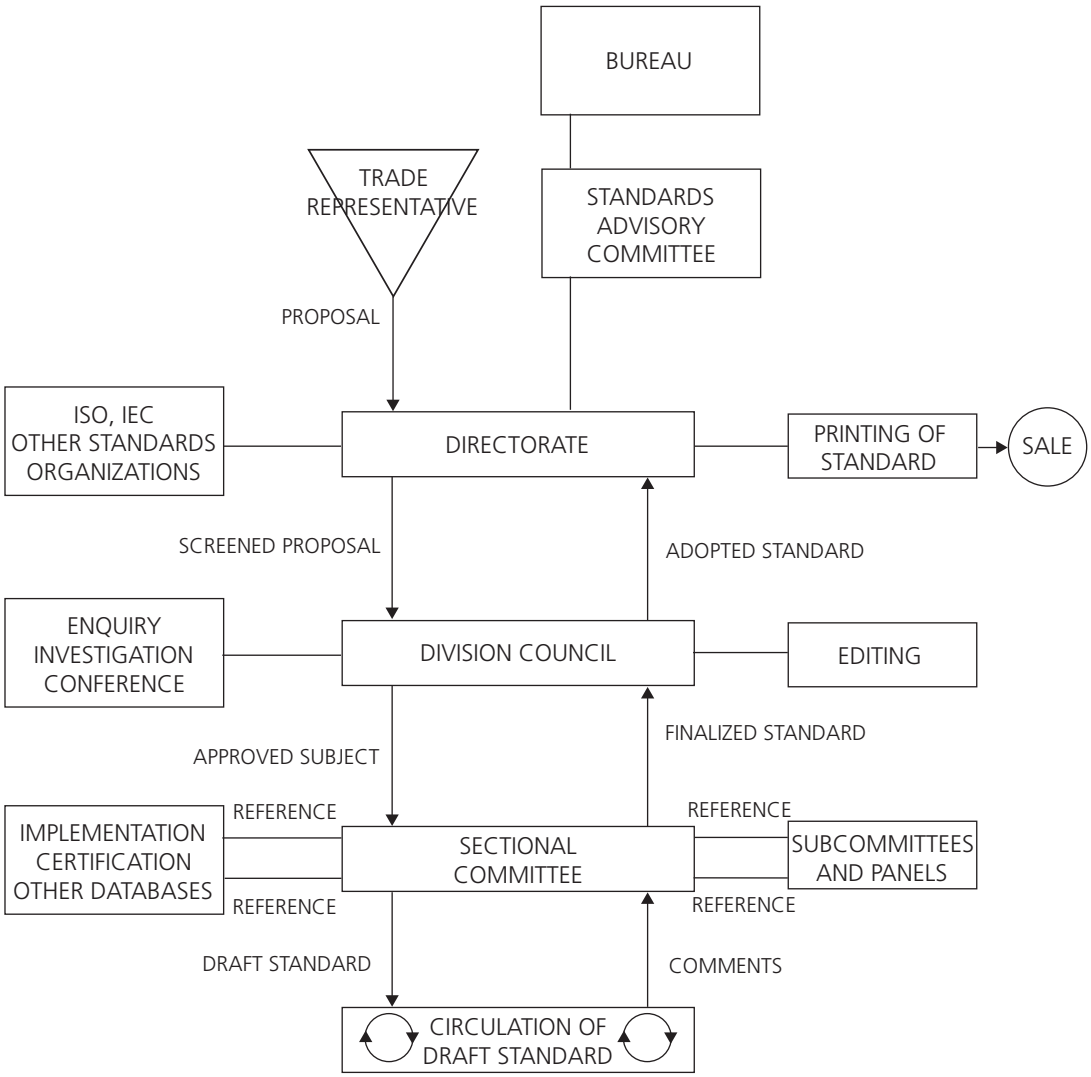
The following steps are generally followed by an NSB in the preparation of national standards:

- A representative of any sector of the economy (such as a trade association or a professional association) submits a proposal to the NSB for preparing a new standard or revising or amending an existing standard;

- The directorate of the NSB preliminarily examines the proposal to determine whether it is consistent with the underlying principles for the preparation of standards;
- The division council decides to approve or reject the new project for the preparation or amendment of a national standard;
- After approval by the division council, the work is allotted to the existing technical committee or sectional committee;
- The technical committee prepares the draft standard or alternatively, the committee may appoint a subcommittee and/or panels. After the draft has been prepared by the subcommittee, the technical committee reviews it extensively and then passes it on to the Secretariat for editing and wide circulation;
- The draft is widely circulated. The aim of wide circulation is to inform every interest in the country or abroad that may be affected by the draft and to invite critical review and comments. Any comments received are incorporated into the draft, which is amended accordingly;
- The comments on the draft are systematically examined by the technical or sectional committee. In the light of committee discussions, the final version of the draft is drawn up by the Secretariat;
- The final version of the draft is submitted to the division council for approval and finally to the General Council or its chairman. Once approved by these offices, it becomes a national standard;
- The approved standard is issued by the Secretariat in a publication that is produced for sale to the public, with wide publicity about the new standard given in the press and in the journal of the NSB. Figure II illustrates the flow for the development of standards by NSBs.

National standards can be mandatory or voluntary. Mandatory standards are found in countries with a centrally controlled economy, while countries with a free enterprise economy normally have voluntary standards. In most countries there is a mixed or selective approach in the enforcement of national standards. This means that all standards are voluntary except those that deal with safety and health. Developing countries can benefit considerably in adopting international standards as national standards, since the process of developing standards is time-consuming and costly.

Figure II. Process for the development of standards



4 INTERNATIONAL STANDARDIZATION

The ultimate goal of standardization is to achieve international accord on all technical matters relating to the exchange of goods and services between one nation and another.

The creation of the first international body to undertake standardization work at international level in the electrotechnical field dates back to 1906, when 15 countries officially established the International Electrotechnical Commission (IEC). Pioneering work of standardization in other fields was started in 1926 by the International Federation of the National Standardizing Association (ISA). The activities of ISA came to an end in 1942. In 1946, delegates from 25 countries met in London and decided to create a new international organization whose purpose would be to "facilitate the international coordination and unification of industrial standards". The new organization was called the International Organization for Standardization (ISO), and officially began its operations on 23 February 1947. The abbreviation ISO was derived from the Greek word *isos*, meaning "equal". Therefore, whatever the State, whatever the language, the short form for the name of the organization is always ISO.

At present ISO is a network of NSBs of 148 States, on the basis of one member per country, with a central secretariat in Geneva, Switzerland, that coordinates the system. ISO is a non-governmental organization. Its members are not, as in the case of the United Nations system, delegations of national governments. Nonetheless, ISO occupies a special position midway between the public and private sectors. This is because, on the one hand, many of its member institutes are part of the governmental structure of their countries, or are mandated by their government, and on the other hand, some ISO members are uniquely from the private sector, as they have been set up by national partnerships between industry associations. ISO acts as a bridging organization in which a consensus can be reached on solutions that meet both the requirements of business and the broader needs of society.

Benefits of international standards

The international standards of ISO contribute to benefiting consumers, businesses, governments and society at large in the following ways:

For consumers: conformity of products and services with international standards provides assurance to consumers on the quality, safety and reliability of these products and services.

For businesses: by adopting international standards, suppliers can conduct the development of their products and services on the basis of specifications that have wide

acceptance in their sector. This in turn means that businesses that use international standards are increasingly free to compete in many more markets around the world. The application of international standards facilitates contracting and ordering of goods and services and the assessment of their quality—it also reduces disputes over specifications and quality.

For governments: international standards provide the technological and scientific bases that underpin health, safety and environmental legislations.

For everyone: international standards can contribute to quality of life in general by ensuring that the transport modes, machinery and tools we use are safe.

For the planet: international standards on air, water, and soil quality, and on emission of gases and radiation, can contribute to efforts to preserve the environment.

International Organization for Standardization (ISO)

Standards of ISO are developed by technical committees that consist of experts from various countries. A Draft International Standard (known by its prefix DIS) is circulated to ISO member bodies (NSBs) for comments and balloting. The NSBs obtain comments on the DIS from the interested parties and send them to the technical committee of ISO concerned. If the vote is in favour of the DIS (i.e. if 75 per cent of the members accept the DIS), the document with due modifications is again circulated to member bodies as a Final DIS (FDIS). If the vote by member bodies is in favour of the FDIS (again by a majority of 75 per cent of the votes), the document is then published as an International Standard. These standards are available on sale directly from the ISO or from NSBs.

Standards by the ISO are voluntary. Some ISO standards, especially those that deal with health, safety or the environment, may be adopted by the regulatory authorities in the countries as a part of their legislation. The ISO itself does not regulate or legislate. However, although ISO standards are voluntary, they may become a market requirement, as has happened with the ISO 9000 Quality Management System; other examples of standards that are applied very consistently in the transport and finance industries are the international standards for the dimensions of freight containers and the international standards for bank cards.

International Electrotechnical Commission

The International Electrotechnical Commission (IEC) was founded in 1906 and is responsible for standardization, inter alia, in electricity, electronics, magnetics, energy production and distribution, telecommunication, electroacoustics and associated general disciplines such as terminology and symbols, measurement and performance, dependability, design and development and safety and the environment. The IEC has published over 5,000 standards.

ISO collaborates with the IEC. Both ISO and the IEC have their central office in Geneva, Switzerland and operate according to similar rules. These two organizations have jointly developed guidelines on various conformity assessment techniques (e.g. inspection, testing, product certification, system certification, accreditation and mutual recognition).

International Telecommunication Union

The International Telecommunication Union (ITU) is a specialized agency of the United Nations; ITU membership currently includes some 190 member States and over 650 sector members. The international recommendations of the ITU are developed in the field of both telecommunication and radio communication. The ISO, the IEC and the ITU collaborate very closely on standardization in the area of information technology and telecommunication.

Codex Alimentarius Commission

The Codex Alimentarius Commission (Codex) was established in 1962 in Rome, Italy as an intergovernmental agency of the United Nations under the Food and Agriculture Organization and the World Health Organization (WHO). Currently Codex comprises 158 member States. The voting members (one State, one vote) for the development of the Codex standards are the national agencies, departments or ministers that regulate the production of food, rather than the national standard organizations that vote for the development of ISO standards.

Codex is responsible for the development of the Codex Alimentarius, or food laws. Codex Alimentarius is a set of international standards that govern all food products, whether the foods are raw, semi-processed or processed. The Codex standards contain requirements to ensure sound, wholesome and safe food.

In addition, the standards also ensure that food is free from adulteration and properly labelled. Since its inception, Codex has developed over 230 food standards and 185 codes of hygiene and sanitary practices. Codex has published 25 guidelines for contaminants, established over 2,500 limits for pesticide residues, evaluated the safety of over 750 food additives and appraised over 150 veterinary drug residues. Codex has also developed guidelines covering the Hazard Analysis Critical Control Points (HACCP) principles and their implementation in the area of food safety.

Other international standardizing bodies

A large number of international organizations are in liaison with ISO and IEC and participate to varying degrees in their work. Several of these organizations conduct standardization activities in their own area of interest, which are recognized at the international level. Some of these organizations publish normative documents. A list of such international bodies is given in annex A.

Regional standardization

Countries in the same region have similarities in climate, culture, governmental policies, consumption, industrial production and other areas. Therefore, there might be a need for common standards. In order to deal with these regional issues in the field of standardization, regional standards organizations are working in various regions of the world. The important ones are:

European Committee for Standardization

Founded in 1961, the European Committee for Standardization (CEN) draws up European standards and regroups 22 European institutes. CEN has witnessed strong development with the formation of the European Union. CEN has published some 8,300 European standards and approved documents.

Founded in 1959, the European Committee for Electrotechnical Standardization (CENELEC), fulfils within the electrotechnical sector the same functions as CEN.

The European Telecommunications Standards Institute (ETSI), develops European standards in the telecommunications field. ETSI regroups over 750 members (including, inter alia, administrations, operations, research bodies, industrialists and users) representing some 55 countries in the European Union, the European Free Trade Association (EFTA) and Eastern Europe.

Pan American Standards Commission

The Pan American Standards Commission (COPANT) was initiated in 1961 and acquired its present constitution in 1965. Membership includes Canada, many countries of the Caribbean area, Mexico, the United States and most Central and South American countries. The Commission develops all types of product standards, standardized test methods, terminology and related matters. The headquarters of COPANT are in Buenos Aires, Argentina.

Arab Organization for Standardization and Metrology

The Arab Organization for Standardization and Metrology (ASMO) came into existence in 1967. Its membership includes Egypt, Iraq, Jordan, Kuwait, Lebanon, the Libyan Arab Jamahiriya and the Syrian Arab Republic. The objective of ASMO is to unify technical terms, methods of testing, measurements and specifications among Arab States. This in turn is aimed at raising productivity and quality of goods to facilitate exchange, trade and cooperation in the fields of economy, industry, agriculture, science and culture.

African Regional Organization for Standardization

The African Regional Organization for Standardization (ARSO), established in 1977, is the African intergovernmental body mandated to promote standardization activities in Africa, bearing in mind the blueprint for Africa's economic development as

outlined in the Lagos Plan of Action. ARSO has developed a comprehensive programme on standardization and related activities in Africa. The objective of standardization by ARSO is to elaborate and harmonize regional standards in order to remove the technical barriers that hinder intra-African trade. Twenty-four African countries are members of ARSO including, inter alia, Egypt, Ghana, Kenya, Liberia, the Libyan Arab Jamahiriya, Malawi, Mauritius, Niger, Nigeria, Senegal, Sudan, United Republic of Tanzania, Tunisia, Uganda and Zambia.

Developing countries and international standards

International standards developed by ISO offer developing countries practical solutions to many economic and technological problems. These standards have the advantage of being backed by international consensus on the state of the art. Implementing ISO standards brings many advantages to developing countries, namely:

- Avoiding waste of resources by allowing countries to take advantage of the work done in the framework of ISO and not having to "reinvent the wheel". Many of the international standards developed by ISO, and in particular the basic standards for quantities, units, symbols, drawing practices, tolerances, terminology and a large number of ISO methods can be directly adopted by developing countries, as these standards and methods are not related to any particular level of technology;

- International standards act as a vehicle for the transfer of technology. The active participation and interest of every developed country in ISO work means that international standards represent an international consensus on optimum technological solutions to standardization problems. With the publication of more than 13,000 international standards in diverse fields, ISO has greatly reduced the dependence of developing countries on the national standards of developed countries. Every international standard is easily available to developing countries. Its use does not require any outflow of foreign exchange;

- ISO standards provide internationally accepted specifications that can be applied to the development, manufacture and marketing of local goods and services, thus raising a country's ability to compete in export markets around the world;

- International standards and guidelines developed jointly by ISO and IEC on product, personnel and system certification and for accreditation of bodies providing certification, inspection and testing services provide opportunities for developing countries to demonstrate product and system conformity in foreign markets;

- International standards for grading, sampling, inspection and testing methods for commodities produced in developing countries, especially for goods such as spices, mica, tea and rubber, provide the basis for efficient utilization and processing at home, and for effective marketing abroad;

- While divergent national standards could become barriers to trade, the adoption of international standards by national exporters and importers can reduce such technical barriers.

Developing countries can discuss their technological problems in different international forums so that international standards ultimately reflect their needs and requirements. For this reason, it is vital that developing countries participate in the various ISO committees which deal with issues that may have economic repercussions for them.

ISO has established DEVCO, a policy committee which is composed of more than 100 countries and deals with matters relating to developing countries, in order to address the needs of developing countries in particular. The main objectives of this committee are as follows:

- To identify the needs of developing countries in the fields of standardization and related areas such as quality control, metrology and certification, and if necessary, to assist individual countries in identifying their specific needs;
- To provide a forum for discussion and exchange of experience on all aspects of standardization and related activities in developing countries.

The activities of DEVCO include:

- Training, including seminars, fellowships, assistance in establishing training and consultancy arrangements under bilateral and multilateral programmes, as well as training in the work of the technical committee secretariat at ISO;
- Financial assistance for participation in ISO standards committee meetings;
- Advice on setting up documentation and information systems;
- Preparation and publication of development manuals. Currently 11 such manuals are available, including: *Application of Standards, Establishment of a Testing Laboratory*, *Environmental Management and ISO 14000*, and *Standards Work on the Net*.

It goes without saying that, in order to obtain the full benefit of the vast exchange of know-how and experience that is invested in the development of the international standards of ISO, a very high level of commitment and the corollary financial means are required in the developing countries themselves.

UNIDO and ISO signed a memorandum of understanding in order to establish a strategic partnership between the parties, to ensure that standardization and industrial development enhance economic growth and to assist the beneficial integration of developing countries, least developed countries and countries with economies in transition into the global economy. UNIDO is one of the key international organizations actively participating in the activities of DEVCO.

5 TYPES OF STANDARDS

There are several types of standards; these include:

- Vocabulary standards, e.g. glossaries, signs and symbols;
- Basic standards, such as units of measures;
- Product standards that cover, inter alia, specifications for dimensions, performance, health, safety, environmental protection and documentation;
- Standards for inspection, test methods and analysis;
- Standards that focus on organization, such as for logistics, maintenance, inventory management, quality management, project management and production management.

Vocabulary standards

Vocabulary standards cover glossaries and definitions of terms. These standards provide uniformity and cohesion for interpreting terms used in various other standards. Sometimes, a short glossary of terms with their definitions is included in the subject standard itself. But whenever a separate glossary on a given subject exists in a standard form, a mere reference to it in the subject standard is considered adequate. For example International Standard ISO 9000:2000 covers vocabulary of most of the quality management related terms; these are repeated as a "normative reference" in other standards such as ISO 9001:2000 (Quality management systems—Requirements).

More than 150 vocabularies have already been published by ISO. A few examples are *Paper Vocabulary, List of Equivalent Terms Used in the Plastic Industry*, *Vocabulary for the Refractory Industry* and *Vocabulary of Information Processing*.

Another example is *International Electrotechnical Vocabulary* (IEV) whose first edition was published as far back as 1938. It has since been re-edited and expanded and the second edition, that contains over 8,500 terms and definitions in English and French (with equivalent terms in German, Spanish, Italian, Dutch, Polish and Swedish) is undoubtedly one of the most valuable publications of the IEC. The IEV at present is composed of 24 booklets separately covering vocabulary relating to electronics; electroacoustics; scientific and industrial measuring instruments; generation, transmission and distribution of electrical energy and telegraphy and telephony.

Symbols and coding, which can rapidly be adapted to any language (e.g. for signs at airports and on highways) provide a useful means of resolving linguistic difficulties. Examples of this are found in ISO/R128 and 129 Engineering Drawing, ISO/R406 Inscription of Linear and Angular Tolerances, and ISO/R1101 Tolerances of Form and

Position. Taken together, these recommendations enable engineering drawings of any one country to be correctly interpreted in any other country—this is of significant help to industry.

Basic standards

The basic units of the SI system (Système international d'unités or International system of units) was defined and adopted by CGPM (Conférence générale des poids et mesures). The seven basic units of the SI system are:

Length	metre (m)
Mass	kilogram (kg)
Time	second (s)
Electric current	ampere (A)
Temperature	kelvin (k)
Substance	mole (mol)
Luminous intensity	candela (cd)

Incidentally, it may be noted that ultimate length standard is no longer the prototype metre; it is now defined in terms of a given number of wavelengths of a certain light.

The IEC, ISO and the International Organization for Legal Metrology (OIML) have published a number of standards and recommendations relating to measurement. Other international organizations that publish guidelines and recommendations relating to measurement include the International Bureau of Weights and Measures (BIPM), International Federation of Chemical Chemistry and Laboratory Medicine (IFCC), International Union of Pure and Applied Chemistry (IUPAC) and International Union of Pure and Applied Physics (IUPAP).

Product standards

For products, standards that contain specifications are the most common: they cover in a comprehensive manner the requirements for a material or product. These specifications provide the user with comprehensive guidance for producing, processing, selling, purchasing and using the product. These standards may include requirements for dimensions, performance, packaging, labelling, methods of sampling and test methods. Alternatively, these requirements may be defined in separate standards.

Specification standards contain three categories of requirements, namely: *obligatory requirements* (essential characteristics that are needed to ensure the usefulness of a product), *optional* or *recommendatory requirements* (which help to improve the serviceability of a product or to meet the specific requirements of a particular type of customer) and *informative requirements*.

Product and material standards can be used as the basis for contracts in commercial dealings. National or third party product certifications can only be awarded if these product standards are used. International standards organizations such as ISO, IEC, CODEX, the European Union (through its product regulations) and various NSBs regularly issue new product standards or revise existing ones to keep pace with market requirements and changing technologies.

Standards on sampling, inspection, test methods, grading, packaging, labelling, supply and delivery

- Methods for sampling and inspection are quite often incorporated into specification standards. Sometimes these may be indicated in a separate document and then referred to in the specification standard. For example, there are separate standards for the sampling of bulk commodities such as iron ore, coal and cereals.
- Methods for testing and analysis are also quite often incorporated into specification standards. However, when extensive details about test methods are to be given, these standards are published as independent standards. For example, a separate series of ISO standards and national standards is available on the testing of water, petroleum products, dairy products, electrical appliances, paints and textiles.
- Methods for grading and classification are sometimes dealt with within the body of the specifications for the materials or products. For many bulk materials like coal and metallic ores, separate methods of grading and classification are available: grades are generally given as Grade A, Grade B, etc. or Class 1, Class 2, etc. to express the hierarchy of individual grades.
- Packaging and labelling requirements are generally not a part of specification standards and separate standards exist for them. A large number of standards have been published for packaging material (paper, cardboard, etc.) and other packages such as cans, tins, drums, barrels and containers. These standards also describe the methods used for testing the packages considered.
- Supply and delivery conditions are also quite often a part of specification standards. When these conditions are of a more technical nature (e.g. concerning sampling, inspection, packaging or labelling) they are generally included in the specification type of standards. Nonetheless, independent standards on supply and delivery conditions are also available that deal mainly with contractual obligations.

Standards on organization

Beyond dealing with products, test methods, sampling, inspection and packaging, national and international standards have been developed that cover various management techniques, which include:

- Inventory management
- Production management
- Banking transaction documentation
- Information technology
- Logistics
- Quality management systems (ISO 9000 series)
- Environmental management systems (ISO 14000 series)

The following documents are further examples of standardization carried out by industrial bodies in the area of organization:

QS 9000	*Quality System Requirements for Automatic Suppliers*, published by Chrysler, Ford, General Motors and others.
TL 9000	*Telecommunications-specific Quality Management System Requirements*, published by QUEST-USA.
AS 9000	*Aerospace Unique Requirements*, published by the SAE.
OHSAS 18001	*Specifications for Occupational Health and Safety Management Systems*, published by three NSBs and 10 certification bodies.
HACCP	*Hazard Analysis Critical Control Point System* and *Guidelines for the Food Industry*, published by CODEX.
SA-8000	*Social Accountability*, published by the Council of Economic Principles Accreditation Agency (CEPAA).

6 IMPLEMENTATION OF STANDARDS

In the area of standards, implementation means the use of standards (*a*) by industries in their manufacturing processes or in other operational or managerial activities, (*b*) by state-organized purchasing organizations such as government departments, railways, post and telegraph departments and (*c*) by private purchasers such as builders, contractors and cooperative stores. In countries with a controlled economy, implementation of national industrial and business standards could be made mandatory, while in countries with open economies, such as the United States, the United Kingdom, Japan and Australia, implementation is voluntary. In developing countries with mixed economies, the implementation of standards is generally voluntary, inter alia, because:

- It is difficult to enforce standards when seller market conditions prevail for raw materials and for finished products in the industrial sectors;
- The purchasing power of the common consumer is relatively low in many developing countries. If standards were introduced on a mandatory basis, this could raise costs and put products out of the reach of common consumers.

However, Governments may enforce standards for products which may affect the health and safety of users. For example, in India, out of 17,900 Indian Standards published by the Bureau of Indian Standards, only 118 require compulsory certification for certain products. These products include food colours, food additives, milk products, bottled drinking water, oil pressure stoves, cement, electrical appliances, dry cell batteries, LPG cylinders and plastic feeding bottles for infants.

Implementation by industry

It is a general perception in the industry that if a product manufactured by a company conforms to relevant national or international standards, this means that the company has implemented the required standards. In fact, this is only a part of the implementation of standards and is not sufficient in itself. It is possible to expand the implementation of standards, whether these are company standards, national standards or international standards, to various departments/branches of a company, including for example, the design department, materials management, manufacturing or quality assurance. Some examples of the application of standards in these functions and of the advantages of this approach are described below.

Design department

- Restricting the variety in the size of parts, components and hardware to suit a company's needs is of advantage;
- Standardizing the formats for supplying information on design outputs (drawings, specification and test methods) to the production department and to other departments ensures correctness, clarity and completeness;
- Standardizing those materials, components and subassemblies that are used in new designs helps to lower production costs.

Materials management

Standards can be applied to various activities of materials management, such as procurement, storage, handling and issues, inventory control, inspection of incoming materials, and the administrative activities of the purchasing and storage departments. For example:

- Relating the purchase specification for raw materials and consumables to the corresponding company, national or international standards or those available in the market from reputed manufacturers or branded products;
- Reducing variety in the number of types and/or sizes of items kept in stock by eliminating the least consumed types and/or sizes after analysis of consumption patterns;
- Standardizing of bin and shelf sizes to suit the sizes of packages of materials;
- Using sampling plans and test procedures as given in the relevant national or international standards;
- Standardizing administrative tasks, inter alia, for purchasing, storage and issues by using standard procedures, forms and formats. Some forms that can be standardized include standard enquiry letters, purchase orders, goods received notes, issue requisitions, master bin cards and stock verification sheets.

Manufacturing

Most manufacturing standards are company standards and therefore productivity depends largely on the scope and adequacy of company standards in this area. Manufacturing standards can be classified as:

- Technical standards that deal with processes, materials, tools, planning methods, the movement of materials and storage, and operator safety;
- Managerial standards that deal with operational procedures and systems in the company.

Some benefits of using standards in the production department are: streamlining of production processes and methods and using standardized equipment, tools, gauges and fixtures. This results in increased productivity, better utilization of machine capacity, simplification of process planning, scheduling, production control and production reporting.

Quality assurance

Standards can be used for activities such as inspection and sampling methods, calibration of instruments, type testing of products and quality audits. In addition, standardized guidelines based upon national or international standards can be prepared for the development of quality plans, analysis of customer complaints, rating of suppliers and control of documents. The ISO 9000 series of standards has been adopted around the world for defining and documenting quality management systems for organizations of any size and type. Implementation of these standards benefits the organization in many ways, such as increased productivity and efficiency, the consistent delivery of products that conform to customer requirements and improved customer satisfaction.

Implementation by bulk purchasing organizations

Bulk purchasing organizations in the private and public sectors rely on standards by giving preferences to such suppliers whose products conform to relevant national and international standards, whose products bear national product certification marks, or who have implemented quality management systems in accordance with international standards such as ISO 9000. Moreover, the tender documents issued by these organizations make extensive use of standards while fixing specifications for various products and selecting methods for their inspection, testing and certification.

Other important areas for implementation

The following tasks that are performed by NSBs and other agencies also make use of standards:

- Product certification
- Preshipment inspection
- System certification

Product certification

Product certification is a procedure in which a third party gives written assurance that a product, process or service conforms to specified requirements. Product certification involves the issue of a mark by a third party to demonstrate that a specific product meets a defined set of requirements that are usually specified in a standard, such as for safety, fitness for use and/or interchangeability.

Product certification that is carried out by third party certification bodies (i.e. that are independent of the consumer, seller or purchaser) is the most acceptable to purchasers, importers and regulatory authorities. Many NSBs, especially in developing countries, provide third party product certification services, which include placing their certification mark on the product, along with the reference number of the standards used as criteria for testing the product.

The implementation of national standards, especially by small and medium-sized companies, provides these companies the opportunity to obtain third party certification for their products. Product certification provides marketing edge and a level playing field for small companies to effectively compete with large companies in both domestic and international markets. Even large purchasing organizations give price preference to products that bear a national product certification mark.

Preshipment inspection

Compulsory preshipment inspection of certain export products has been introduced in some developing countries in order to protect the image of the country's export products by ensuring that only conforming products are actually shipped. A government may have particular concerns about certain imported products for which there are some particular health or safety issues domestically. The WTO Agreement on Preshipment Inspection (PSI) provides that for conducting PSI for the quality and quantity of products, standards agreed between the buyer and seller or in their absence, international standards should be used. Many other regulatory bodies that prescribe compulsory PSI on exports or imports do prescribe standards as a basis for accepting goods. These standards also make reference to national or international standards.

System certification

There is a rising trend towards moving from product certification to system certification. This means that the supplier's credibility is demonstrated by the assessment and certification/registration of his system. The most popular certifications are the ISO 9000 certification for Quality Management Systems and the ISO 14000 certification for Environmental Management Systems. Both systems are available to industry for implementation and subsequent certification on the basis of national and international standards.

International standards have played a vital role in popularizing the system certification process and many States have adopted international standards for systems such as the ISO 9000 and ISO 14000 series without modifying them. This approach is one of the best examples of implementation of standards at international level.

Another example of implementation of standards is the development of standards at the company and industry level for immediate use by all persons concerned within the company (chapter 2).

7 STANDARDS AND TECHNICAL BARRIERS TO TRADE

Governments and industry in the developing and least developed countries make serious efforts to increase exports and reach new international markets. To attain success in global markets, it is essential that our customers are satisfied with both non-price and price factors. Quality of the product and its conformance to customer requirements is very often the single most important consideration in securing export growth.

Technical barriers

Among several constraints to trade, such as economic and procedural matters, technical (non-tariff) barriers to trade have emerged as a vexing problem. Technical barriers include standards, technical regulations, testing of products from accredited laboratories, sampling, inspection and certification systems. Unfortunately, each State has its own standards for products, its own technical regulations under a given legislation and other specific requirements. This plethora of technical documents that cover the same product both for import or export creates tremendous, but avoidable, confusion.

For instance, there are more than 130 States that are preparing national standards. In addition, a large number of government departments issue standards on subjects of their interest. In some States, several standardizing bodies represent large manufacturing interests (e.g. in the United States). This results in three undesirable situations. First, for the same product the requirements of different States are different when national standards are compared. Second, for the same product there is divergence in the State between national standards and governmental and industry standards. Third, some States may have more than one standard that may cover different aspects of the same product.

This creates a major challenge for exporters, who may find it difficult to know which standards need to be satisfied for the same product. In the process, exporters may face losses due to low volumes of sales, increases in costs and eventually, they may even lose their markets altogether.

In addition to the large number of standards to be followed, States have their own Acts and Laws, of which technical regulations form a statutory part. Because the technical regulations are statutory in nature, it is not possible to deviate from them. These regulations may refer to national standards or other governmental standards. At the outset it is not possible for an exporter to fully be aware of all the technical regulations and standards and all their amendments over the years by the State concerned. Additionally, a number of new standards and regulations, about which a potential exporter may have no prior knowledge, may be in preparation in a given State.

Overcoming technical barriers

The constraints described in the preceding paragraph are called "technical barriers to trade" and make it difficult, even sometimes impossible, for an exporter to trade with another country. Such measures are considered undesirable in the context of world trade, because they restrict the flow of goods and services, drive up prices and are to the detriment of the consumer.

The Secretariat of the General Agreement on Tariffs and Trade (GATT) published a report following the conclusion of the Uruguay Round of negotiations held between 1986 and 1994 with the aim of reducing trade barriers. In this report, the GATT Secretariat estimated that implementing the Agreement, i.e. reducing trade barriers, could result in an increase in world trade of up to $US 510 billion by 2005. These barriers take on many forms, and are generally divided into two broad areas: tariff barriers and non-tariff barriers. Standards and technical regulations are considered to be non-tariff barriers.

The last negotiations of the Uruguay Round gave birth to WTO, which was established on 1 January 1995. More than 145 States are members and observers of WTO. The agreement on Technical Barriers to Trade (TBT) is one of the 29 individual legal texts of the WTO Agreement, which obliges member States to ensure that technical regulations, voluntary standards, and conformity assessment procedures do not create unnecessary obstacles to trade.

The TBT Agreement includes the Code of Good Practice for Preparation, Adoption and Application of Standards. In accepting the TBT Agreement, WTO members agree to ensure that local government, non-governmental and regional standardization bodies follow this code. This code requires standardizing bodies to adopt practices to ensure, among other things, that:

- Standards prepared do not create unnecessary obstacles to international trade.
- International standards are used as a basis for standards development.
- Member States play an active role in the preparation of international standards with a view to harmonizing standards.
- Duplication or overlap with the work of other standardizing bodies is avoided.
- Standards should specify product requirements in terms of performance, rather than design or descriptive characteristics.

In the interest of transparency, the code requires that standardizing bodies that have accepted the code notify this fact to the information centre of ISO/IEC (ISONET) at the ISO central Secretariat in Geneva, either directly or through the relevant national or international member of ISONET (website www.iso.org).

At least once every six months, standardizing bodies must publish their work programmes relating to development of standards and notify ISONET of the existence of

their work programmes. Further, the WTO TBT Standards Code Directory (on the WTO website, www.wto.org) lists those standardizing bodies that have notified acceptance of the WTO-TBT Code of Good Practice for the Preparation, Adoption and Application of Standards. The directory also contains the addresses of these standardizing bodies and information relating to the availability of their work programmes. It is published annually.

8 TECHNICAL REGULATIONS AS BARRIERS TO TRADE

While standards that are developed through a consensus process are voluntary as to their use or implementation, technical regulations, which contain similar information, are established by governmental or other regulatory authorities. The implementation of technical regulations is mandatory. Sometimes a regulation may make use of the available national or international standard and include it in the regulation. The standard then becomes a part of the technical regulation and becomes mandatory or compulsory. It must be noted that regulators develop technical regulations without necessarily taking the views of stakeholders into consideration.

The WTO/TBT Agreement has defined a technical regulation as "A document, which lays down product characteristics or their related processes and production methods, including the administrative provisions, with which compliance is mandatory. It may also include terminology, symbols, packaging, marking, or labelling requirements as they apply to a product, process or production methods."

This definition of technical regulations leads us to the following conclusions:

- Technical regulations are mandatory. This means that technical regulations are a part of legislation. If a company exports a product to a market that imposes technical regulations on that product, the company needs to make sure that its product complies with them, or it will be denied entry. In this connection, the European Union has prescribed product regulations for many categories of products for which the "CE" mark is compulsory for them to be allowed into European Union countries.
- Defining technical regulations is the responsibility of Governments.

Technical regulations encompass the following important aspects:

- *Product characteristics*: characteristics that a product or process has to comply with (these could be in the form of a reference to a standard or they may be defined in the technical regulations). Product characteristics would include the technical requirements for the product such as:

  Dimensions—for this aspect interchangeability is important for safety reasons, e.g. the dimensions of electrical plugs and sockets.

  Design criteria—generally regulations will make reference to certain design codes such as codes given in the national standards, or other authoritative codes.

  Performance criteria—for example, the safety performance criteria that need to be met for automobiles (such as the parameters for braking system performance or crash performance), or the insulation features that are required for electrical appliances in order to ensure safety during their use.

Materials—these are often specified whenever it is difficult to lay down performance criteria, even though the recent approach is to try not to elaborate specific requirements for materials.

- *Process and production methods*: these are only given in the technical regulation when they affect the safety and health requirements of the product. For example, the regulations of certain importing countries (e.g. the United States and the European Union) require that the HACCP Food Safety System be followed by fish processing companies for imports of fish and fishery products.
- *Packaging*: these may include performance requirements of the packaging to ensure that a product arrives intact at its destination and may also include environmental issues arising out of disposal of packaging material such as its recyclability.
- *Marking and labelling requirements*: for food and pharmaceuticals, labelling needs to include ingredients, intended use and shelf life. A "CE" mark on certain products for their admission to European Union countries is an example of a marking on the product that confirms that all the essential requirements set out in the CE certification directives have been met.
- *Administrative provisions*: procedures such as inspection, testing, certification and approvals that should be followed by the suppliers and by the authorities that are competent to accept such products. The purpose of such provisions is to ensure that products meet the requirements given in the regulations.

WTO/TBT provisions on technical regulations

The WTO TBT Agreement deals quite extensively with technical regulations, and lists a number of requirements that have to be fulfilled by WTO members to minimize such barriers.

First, WTO members have to ensure that products imported from another WTO member are accorded the same treatment as products produced locally or by any other member State. This means that a Government is not allowed to set up measures that would discriminate against any imported product.

Secondly, WTO members are not to implement technical regulations that create unnecessary obstacles to international trade. However, they are allowed to impose regulations whenever there is a legitimate reason such as national security requirements, prevention of deceptive practices, protection of human health or safety, animal or plant life or health, or the environment. WTO members have to be able to demonstrate the validity of such measures whenever requested to do so by any other WTO member. WTO members also have to ensure that technical regulations are withdrawn as soon as the reason for their implementation ceases to exist.

Thirdly, WTO members must aim to harmonize technical regulations on as wide a basis as possible. International standards are to be used as the basis for such technical regulations, and members are therefore also urged to take part in the development

of such standards. Technical regulations must be based on product requirements in terms of performance rather than design or descriptive characteristics.

Fourthly, WTO members are generally required to base the technical requirements specified in their regulations on international standards. Should a relevant international standard not be available, or if the technical regulation is not going to be based on the international standard, then the WTO member is obliged to notify other members at an early stage. This measure has been set up so that comments from interested parties can be taken into account and amendments to the technical regulation can be introduced before it is published. Obviously, should an urgent problem of safety, health, environmental or national security risk arise that needs immediate attention, the WTO member has to introduce this measure right away, provided that the member's rationale for doing so is notified and made clear to the WTO Secretariat, and that it can subsequently be defended.

Finally, all technical regulations that are adopted have to be published in such a way that any interested party may become acquainted with them. It is also expected for WTO members to allow a reasonable time for the implementation of an adopted technical regulation to enable exporting countries to adapt their production methods to it, unless, of course, it is a case of emergency.

Obtaining information on technical regulations

The first step in complying with the technical requirements of an importing country is to obtain correct information about these requirements, including the related conformity assessment procedures (such as inspection, testing product certification and system certification) to be followed by suppliers. The lack of readily available information of this kind for suppliers was a major technical barrier to trade in the past. Taking into account the transparency procedure laid down in the WTO/TBT Agreement and increasing access to the Internet, the availability of information about technical regulations, including conformity assessment procedures, has now become more widespread.

Information on the technical requirements of importing countries can be obtained from National Enquiry Points (NEPs), which are required to be set up in each WTO member country. Enterprises can thus obtain relevant information about technical regulations concerning their export products through their NEPs or directly from the NEP of the country to which the product is being exported.

The WTO website (www.wto.org) contains up-to-date information about the contact addresses and websites of NEPs. (Information on technical barriers to trade, including information on NEPs, can be found on the WTO website, under the heading "Trade Topics".)

9 INFORMATION SOURCES ON STANDARDS

The world of standards contains a lot more than simply product specifications and methods of tests. Some standards or standards-related documents are as good as textbooks on their subjects and include codes of practice such as building codes or other important descriptions. Some of the ways in which information on current standards may be obtained are described below.

National standards bodies

The first step for obtaining information on standards is to contact the NSB in your country, if there is one, which will generally have a standards information centre. NSBs keep a collection of their own standards, and they will generally have collections of national standards of other countries, of regional and of international standards. For example, the Bureau of Indian Standards has in its library more than 60,000 standards, including standards issued by international bodies, other NSBs and standards of societies and associations. At standards information centres of NSBs, you will usually be able to consult catalogues of standards from various standards bodies to see which of them apply to your product or any other information relating to standards, which you may need. An NSB will be able to sell you its own standards and it will frequently be licensed to sell you standards from other standardizing bodies. If it does not have the standard you need, you may request the NSB in your country to order the standard for you from the relevant NSB, against payment. Copies of standards are generally not distributed free of charge. There are some exceptions: Codex Alimentarius standards, for example, can be downloaded at no cost from the Codex Alimentarius website (www.codexalimentarius.net).

The Internet

If you do not have easy physical access to your NSB or if there is no NSB in your country and if you wish to obtain foreign or international standards directly from the relevant standards body, you can use the Internet to search for and obtain standards. More and more NSBs are using this medium to sell standards and disseminate information.

The World Standards Services Network (WSSN) is a network of websites of standards organizations around the world. Through the websites of its members, WSSN provides information on international, regional and national standardization and related activities and services (website http://www.wssn.net).

Many websites of national, regional and international standards bodies linked to the WSSN allow you to search for, buy and download standards online. Even if they do not have the complete standards online, you should be able to consult online catalogues and then contact your own NSB, or, failing that, an NSB in another country, or the organization that originally developed the standards to buy a hard copy of the standards you want.

Commercial distributors

Most international and national standards bodies distribute the catalogues of their standards online free of charge and on paper and/or CD-ROM on a cost recovery basis. There are a few companies and organizations which distribute, on a commercial basis, catalogues or CD-ROMs that contain information on the standards of a number of standards organizations, such as ISO, IEC, the British Standards Institution (BSI) and the DIN (Deutsches Institut für Normung). There are also distributors, e.g. Information Handling Services (www.ihs.com), which commercialize CD-ROMs that contain the full text of the standards bodies mentioned. Such collections and the relevant update services are usually quite expensive. In India, a private distributor called Book Supply Bureau (website www.standardsindia.com) sells, inter alia, Indian, ISO, IEC, ITU, British, DIN, AFNOR, JIS, ASTM, API and ASME standards.

Information on standards in preparation

All governmental standardizing bodies in member States of the WTO have to accept and comply with the Code of Good Practice for the Preparation, Adoption and Application of Standards contained in Annex III of the TBT Agreement. Member States also need to take reasonable measures to ensure that their national and other standardizing bodies, which may be governmental or non-governmental, also accept this Code. The Code requires that all standardizing bodies that have accepted the Code should publish their work programmes for the development of standards at least once every six months. Work programmes are to contain the standardizing body's name and address; give details on the new standards that are in preparation and those that have been adopted in the preceding period. A standard is considered to be "in preparation" from the moment a decision is taken to develop a standard until that standard has been adopted. The work programmes of many standardizing bodies are available at no cost by contacting the relevant body.

To obtain information on future standards, you may also contact your country's NSB, which will provide you with information on any standards it is developing that affect you. Your NSB may also be able to inform you of developments in standards in your export markets or in international standards by consulting the work programmes of standards bodies that have accepted that Code.

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Website of the International Organization for Standardization at http://www.iso.org.

Website of the World Standards Services Network at http://www.wssn.net.

Website of the World Trade Organization at http://www.wto.org.

Annex. International standardizing bodies

Name	*Fields of standardization*
Codex Alimentarius Commission (CAC)	Specification, sampling and analysis of food products; food additives; food hygiene; pesticide residues; contaminants; labelling; essential composition; nutritional aspects; veterinary drug residues; inspection and certification systems for foods that are to be imported or exported
Cooperation Centre for Scientific Research Relative to Tobacco (CORESTA)	Analysis and testing of tobacco and tobacco products
Euro-international Committee for Concrete (CEB)	International recommendations and codes of practice for use in building and civil engineering work
FDI World Dental Federation (FDI)	Dental instruments and equipment; working environment of the dentist
Intergovernmental Organization for International Carriage by Rail (OTIF)	International carriage of dangerous goods.
International Air Transport Association (IATA)	Standards for airport and passenger services, cargo services, cargo and passenger agents
International Association for Cereal Science and Technology (ICC)	Testing and analysis of cereals and cereal products
International Atomic Energy Agency (IAEA)	Nuclear and radiation safety standards
International Bureau for the Standardization of Man-made Fibres (BISFA)	Specification and testing on man-made fibres
International Bureau of Weights and Measures (BIPM)	Units, standards and methods of measurement of physical quantities
International Civil Aviation Organization (ICAO)	Air transport; air navigation; aviation safety; airports design; airworthiness; aircraft noise; international law, etc.
International Commission for Uniform Methods of Sugar Analysis (ICUMSA)	Methods of sugar analysis
International Commission on Illumination (CIE)	Metrology in the fields of light, lighting and colour; science, technology and art of light, lighting and colour
International Commission on Irrigation and Drainage (ICID)	Irrigation and drainage; terminology
International Commission on Radiation Measurements (ICRU)	Radiation units and measurements; radiation units and dosimetry
International Commission on Radiological Protection (ICRP)	Radiation hazards and radiation protection
International Council for Building, Research Studies and Documentation (CIB)	The activities of CIB focus mainly on pre-standardization work.
International Council for Standardization in Haematology (ICSH)	Recommendations or recommended methods on haematology for use in medical practice

International Council on Combustion (CIMAC)	Acceptance tests for combustion engines; engine noise; pollution
International Dairy Federation (IDF)	Milk and milk products (composition, sampling and analyses); milk farm and factory equipment; disinfectants
International Federation for Information and Documentation (FID)	Classification
International Federation of Fruit Juice Producers (IFJU)	Fruit juice analysis
International Federation of Library Institutions (IFLA)	Bibliographic control and other aspects of associations and library matters
International Gas Union (IGU)	Safety of gas transmission, distribution and utilization; use of SI units in the gas industry
International Institute of Refrigeration (IIR)	Tests of thermal performance of insulated vehicles; tests of insulated materials; refrigerated storage and transport of perishable foodstuffs; food freezing; refrigerating equipment; terminology
International Institute of Welding (IIW)	Welding and allied processes
International Labour Organization (ILO)	Working conditions and environment; occupational safety and health; equality of treatment between men and women; non-discrimination; rights of tribal and indigenous peoples; employment
International Maritime Organization (IMO)	Maritime safety: prevention of pollution from ships; facilitation of international maritime traffic
International Office of Epizootics (OIE)	Advice on standardization of procedures in the preparation of vaccines, serums, diagnostic reagents etc., to control epizootics
International Olive Oil Council (IOOC)	Table olives; olive oil; olive pomace oils
International Organization of Legal Metrology (OIML)	Measuring methods and units; measuring devices and instruments; verification and control of measuring devices (from a legal point of view)
International Seed Testing Association (ISTA)	Seed testing
International Silk Association (ISA)	Silk testing and classification
International Telecommunication Union-Radio Communication Bureau (ITU-BR)	Radio communications
International Telecommunication Union-Telecommunication Standardization Sector (ITU-T)	All aspects of telecommunication equipment, systems, network and voice and non-voice services, including: telegraphy; telephony; data communication; telematics; message handling; audiovisual; multimedia; integrated services; digital networks; universal personal telecommunication; intelligent networks. All technical, operating and administrative areas, including: service definition; network operation, numbering and routing; traffic engineering; maintenance and telecommunication management network; tariff and accounting principles; data networks; open systems interconnection; switching and signalling; quality of service and performance management; transmission media systems and equipment
International Union of Leather Technologists and Chemists Societies (IULTCS)	Analysis and testing of leather

International Union of Pure and Applied Chemistry (IUPAC)	Nomenclature, terminology, symbols, quantities and units in chemistry
International Union of Railways (UIC)	Projects and studies necessary for the improvement of international rail traffic
International Union of Laboratories and Experts in Materials, Systems and Structures (RILEM)	Nomenclature and testing of building materials and structures
International Organisation of Vine and Wine (OIV)	Methods of wine analysis; oenology; labelling
International Wool Textile Organization (IWTO)	Testing of wool textiles
United Nations Educational, Scientific and Organization (UNESCO)	Scientific and technological information and cultural documentation, libraries and archives
World Health Organization (WHO)	All matters directly or indirectly related to health, including biological and pharmaceutical substances, food additives, pesticides, pesticide residues in food, food safety, air and water quality, diagnostic procedures, terminology, nomenclature and classification
World Intellectual Property (WIPO)	Patents; trademarks; industrial designs; appellations of origin; copyright; neighbouring rights; classification systems
World Meteorological Organization (WMO)	Meteorological and hydrological observations; agricultural, aeronautical and marine meteorology; data processing and telecommunications

Printed in Austria
V.05-90776—October 2006—500

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