

# Standards

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## 3.1 DEFINITIONS AND TYPES OF STANDARDS

### 3.1.1 Definitions

*Standardization* is defined as the *activity* of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context (ISO and IEC 2004a). The activity consists in particular of the processes needed to formulate, issue, and implement standards to improve the suitability of products, processes, and services for their intended purposes: prevention of barriers to trade and facilitation of technological cooperation.

A *standard* is defined by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) as a *document*, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for activities or their results aimed at the achievement of the optimum degree of order in a given context (ISO and IEC 2004a). Standards should be based on the consolidated results of science, technology, and experience and aimed at the promotion of optimum community benefits.

On the other hand, the definition of a standard in the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) makes it clear that the implementation of a standard is voluntary, not mandatory (WTO 1994).<sup>1</sup> Mandatory implementation is the sole realm of technical regulation. The mandatory or compulsory standards of some countries are therefore technical regulations. Another difference between these two definitions of a standard is that the WTO TBT Agreement definition relates to products only, because the TBT Agreement is limited to products and their processes. The ISO and IEC definition is much wider in its application and would include systems and services as well within its general terminology of “activities or their results” (ISO and IEC 2004a).

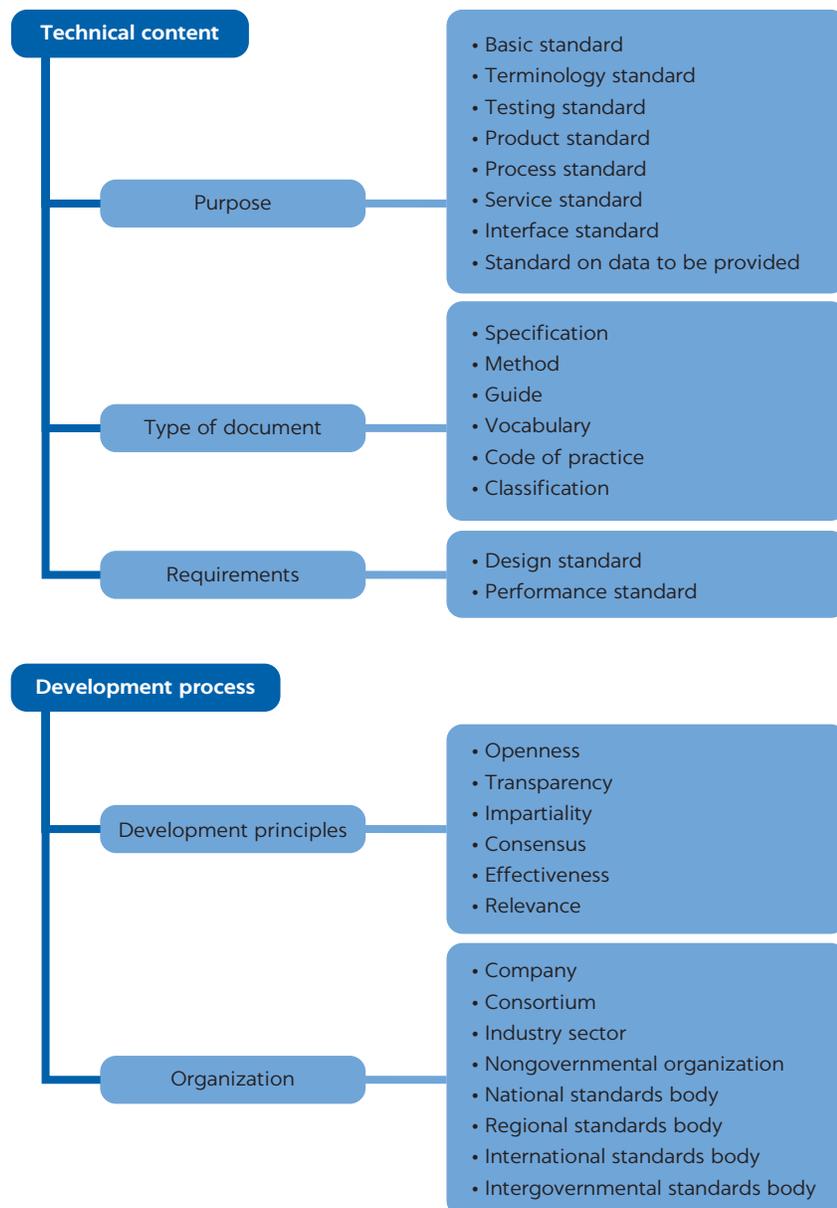
The term “normative document” is sometimes used in the context of standardization; it is seen as a generic term for standards, specifications, codes of practice, and so on. In this publication, the term “standards” is used throughout with the understanding that it also includes specifications, codes of practice, and other normative documents.

### 3.1.2 Public and private standards

Standards can be classified in terms of their content, the mechanism used for their development, and the organization developing the standard. The classification is shown graphically in figure 3.1, showing the wide range of standards that are possible.

Within this classification, two broad categories of standards are generally recognized, namely, public and private standards. Public standards are developed under the auspices of international, regional, and national standards bodies in accordance with principles aligned with WTO TBT Agreement requirements. Private standards are developed by consortiums, certification bodies, nongovernmental organizations (NGOs), and others for their own purposes and often without transparency, openness, or consensus considerations.

**FIGURE 3.1**  
**Classification of standards**



Private standards are important in many markets, but generally cannot be used in technical regulation, because they do not necessarily adhere to the same principles as a formal standardizing organization (the WTO TBT Agreement principles of transparency, openness, and impartiality and consensus), nor are the disciplines of the WTO TBT Agreement’s annex 3 (the “Code of Good Practice for the Preparation, Adoption and Application of Standards”) necessarily used.<sup>2</sup>

## 3.2 INTERNATIONAL, REGIONAL, AND NATIONAL PUBLIC STANDARDS

### 3.2.1 International standards

International standards are important in the global economy. The WTO TBT Agreement confers a high level of relevance on international standards; for example, national standards should be the adoptions of international standards, and national technical regulations should be based on international standards (see module 7: Technical Regulation, section 7.4). They are developed and published with full cognizance of the principles detailed by the WTO TBT Agreement Committee: transparency, openness, impartiality and consensus, effectiveness and relevance, coherence, consideration of the development dimension, stakeholder engagement, due process, and national adoption or implementation of international and regional standards (see section 3.4, “Good Standardization Practice”).

International standards are published by many intergovernmental or non-governmental international organizations. Most of them are sector-specific, but a small number are considered broad-based. Although not specifically mentioned in the WTO TBT Agreement, three organizations—the ISO, IEC, and International Telecommunication Union (ITU)—are considered the pinnacle international standards bodies or the most relevant for the WTO TBT Agreement. The WTO Agreement on Sanitary and Phytosanitary Measures (SPS Agreement) names three organizations—the International Plant Protection Convention (IPPC), World Organisation for Animal Health (OIE), and Codex Alimentarius Commission (CAC)—as being the most relevant for that agreement.<sup>3</sup> Brief descriptions of these six international standards organizations are as follows:

- *International Electrotechnical Commission (IEC)*: Nongovernmental, established 1906, head office Geneva, membership representative of national organizations with similar scope, provides international standards for electrical and electronic goods
- *International Organization for Standardization (ISO)*: nongovernmental, established 1946, head office Geneva, membership representative of national organizations with similar scope, publishes international standards for scopes not handled by others
- *International Telecommunication Union (ITU)*: intergovernmental (part of the United Nations [UN] family), established 1897, head office Geneva, publishes international standards for telecommunication
- *Codex Alimentarius Commission (CAC)*: intergovernmental (part of the UN family), established 1963, head office Rome, publishes international standards for food products
- *International Plant Protection Convention (IPPC)*: multilateral treaty (part of the UN family), established 1951, head office Rome, publishes international standards for plant protection

- *World Organisation for Animal Health (OIE)*: intergovernmental (*not* part of the UN family), established 1924 (as the Office International des Epizooties), head office Paris, publishes international standards for animal health.

Over and above these six, another organization publishing standards that are important from a trade perspective is the International Organization for Legal Metrology (OIML), an intergovernmental treaty organization established in 1955 with its head office in Paris. The OIML publishes international recommendations and standards for legal metrology.

In the ITU, CAC, IPPC, and OIE, all members have the same status. In the case of the ISO and IEC, various levels of membership are possible, with full membership being the highest level. Others, such as associate or corresponding membership, come with lesser privileges. Full membership is generally required to participate fully in technical committees.

There are differences among the organizations in the way in which the technical work on the formulation of international standards is undertaken by their technical committees. The ISO, IEC, and CAC operate a decentralized system whereby member countries are given full responsibility for specific technical committees, whereas the IPPC, ITU, and OIE work with expert-level meetings managed by the secretariats. All of them, however, meet WTO requirements for international standards.

Adopting international standards as national standards is the recommended route indicated in the WTO TBT Agreement. It also makes sense, in that the risk of national standards becoming unnecessary barriers to trade is thereby minimized. To adopt ISO and IEC standards as national standards, membership in the ISO and IEC is necessary because of the copyright status of their international standards.<sup>4</sup> In the case of regional standards bodies wishing to adopt ISO and IEC standards, special arrangements have to be made with the ISO and IEC. None of this is an issue for the standards published by the intergovernmental-type international standards bodies.

### 3.2.2 Regional standards

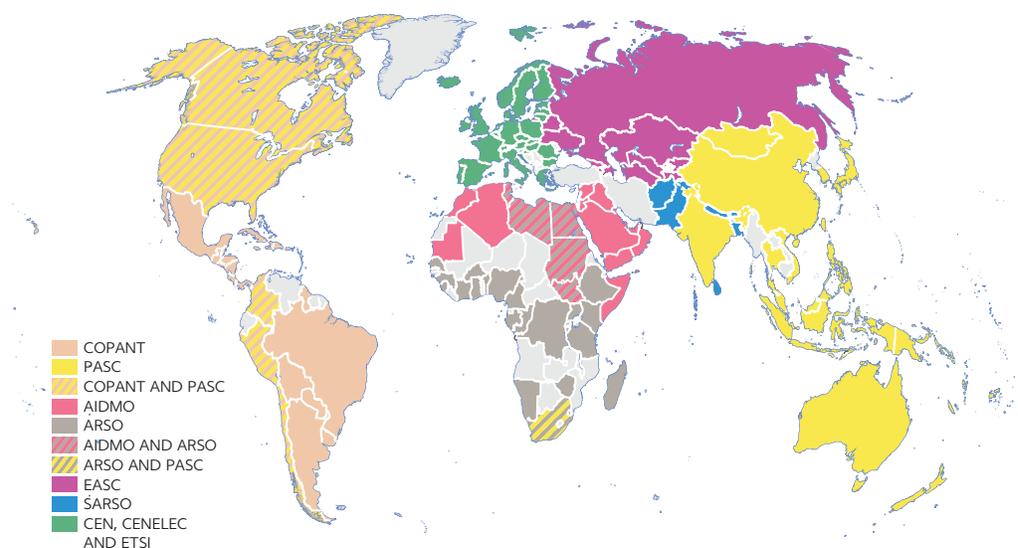
The European Norm (EN) standards recognized by the European Union (EU) are probably the best-known regional standards. These are developed and published also to support the implementation of EU technical regulations known as Directives. They are developed and published by three regional standards organizations (RSOs), namely, the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC), and the European Telecommunications Standards Institute (ETSI). Agreements to harmonize the EN standards with international standards are in place, such as the Vienna Agreement (ISO and CEN) and the Frankfurt Agreement (IEC and CENELEC). EN standards may be well known, but they are not the only regional standards published.

A number of organizations have been established to deal with standardization issues at the regional level, but they can be quite different in their responsibilities and activities. Some of the RSOs have been established as a consequence of political decisions, especially those that are charged with coordinating and harmonizing standardization in a regional common market. There are differences among these as well. A few RSOs actually develop and publish regional standards (for example, CEN, CENELEC, and ETSI), whereas others only act as coordination mechanisms, ensuring that national standards among the common market members are harmonized (such as the Southern African Development

MAP 3.1

## Coverage of regional standards bodies, 2016

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Note: AIDMO = Arab Industrial Development and Mining Organization; ARSO = African Organization for Standardization; CEN = European Committee for Standardization; CENELEC = European Committee for Electrotechnical Standardization; COPANT = Pan American Standards Commission; EASC = Euro-Asian Interstate Council for Standardization, Metrology and Certification; ETSI = European Telecommunications Standards Institute; PASC = Pacific Area Standards Congress; SARSO = South Asian Regional Standards Organization.

Community [SADC] Cooperation in Standards [SADCSTAN]). Some RSOs operate in geographical regions (as does ARSO, on the African continent), and others operate across regions (such as the Pacific Area Standards Congress [PASC]).

The RSOs generally accepted by the ISO and IEC as representative, and with which they foster cooperation, include the following (map 3.1):

- *AIDMO*: Arab Industrial Development and Mining Organization
- *ARSO*: African Organization for Standardization
- *CEN*: European Committee for Standardization
- *CENELEC*: European Committee for Electrotechnical Standardization
- *COPANT*: Pan American Standards Commission
- *EASC*: Euro-Asian Interstate Council for Standardization, Metrology and Certification
- *ETSI*: European Telecommunications Standards Institute
- *PASC*: Pacific Area Standards Congress
- *SARSO*: South Asian Regional Standards Organization

Over and above the RSOs accepted by the ISO and IEC as being representative of a region, a number of subregional standards organizations have also been established to serve the interests of smaller regional common markets, such as the East African Community (EAC), the Economic Community of West African States (ECOWAS), the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), and others in Africa. Subregional standards organizations include the following:

- *CROSQ*: Caribbean Community (CARICOM) Regional Organization for Standards and Quality

- *EAC Standards Committee*
- *GSO: Gulf Cooperation Council Standardization Organization*
- *SADCSTAN: SADC Cooperation in Standards*

It is interesting to note that some countries have dual membership, such as in COPANT and PASC or in ARSO and PASC. Whether dual membership can be sustained once regional standards are developed for adoption in member countries is unclear. Other organizations, such as the Regional Institute for Standards, Conformity Assessment, Accreditation and Metrology (RISCAM) of the Economic Cooperation Organization (ECO)—an assembly of Islamic countries in the Middle East and on the South Asian subcontinent—are still in the making at the time of this writing.

A country's national standards body (NSB) is usually required to participate in the RSO when the RSO develops standards for the common market of said region; the NSB has no choice in the matter. Other RSOs offer a choice, and membership will depend on the political and trade alliances the country finds itself in with other members of the RSO. Where RSOs publish standards as a remit of a common market agreement or protocol, the NSBs of the regional common market usually must adopt regional standards once they have been approved and withdraw their national standards of similar scope.

### 3.2.3 National standards

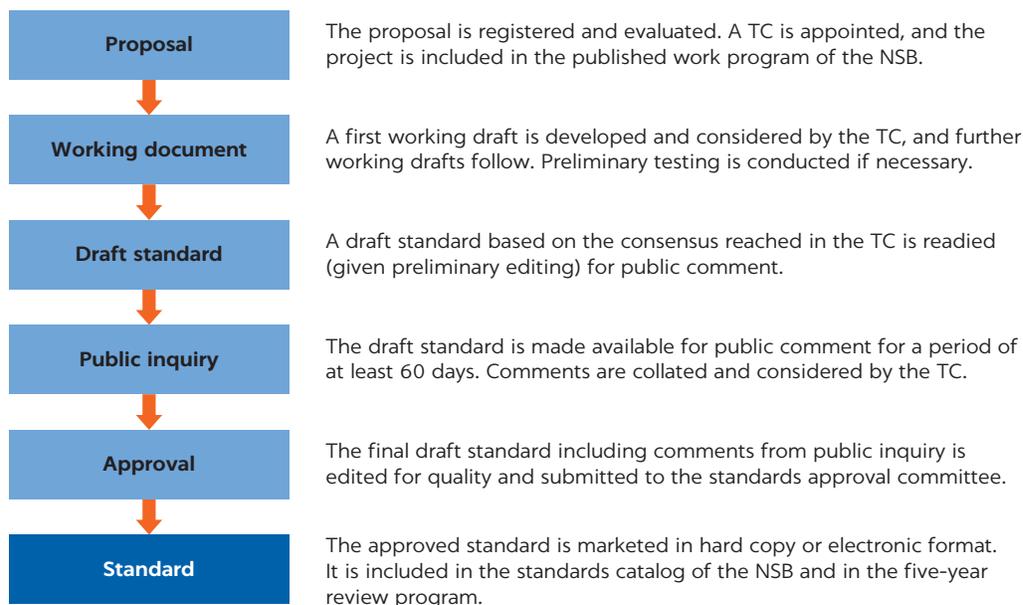
National standards are published by recognized NSBs. The legal status of a national standard is an important parameter to ensure that the standard can be easily referenced in legislation, such as in a technical regulation. In smaller economies, a single organization will act as the NSB, whereas in high-income economies, a more decentralized system for the development of standards may be in operation, with a number of standards development organizations (SDOs) recognized by the NSB in place. Whatever the system, the central government has to ensure that the organizations developing national standards comply with the WTO TBT Agreement requirements if the country is a WTO member.

The pertinent requirements for the development of national standards are contained in annex 3 to the WTO TBT Agreement, the “Code of Good Practice for the Preparation, Adoption and Application of Standards” (WTO 1994). Standards bodies have to formally indicate their acceptance of and compliance with annex 3 of the WTO TBT Agreement. Notifications under annex 3 are circulated by the WTO Secretariat in the document series designated by G/TBT/CS/N/[number]. The complete list of NSBs having accepted the conditions of annex 3 can also be found at the online WTO ISO Standards Gateway.<sup>5</sup> Whereas NSBs accept the conditions of annex 3 as a self-declaration of compliance, it is not a given that an NSB's processes always comply with the requirements. An independent assessment of the standards development processes for compliance with annex 3 frequently highlights challenging areas for many NSBs.

The process of developing national standards should also comply with the principles of good standardization practice (GSP), as discussed in section 3.4. The complete value chain for standards development therefore needs to be properly managed by the NSB. For each of the steps in the value chain (figure 3.2), formal processes should be in place. These should be publicly known and understood.

A developing trend is for the NSB to publish these processes in a “standard for a standard” and make it freely available to any interested party. The training of technical committee chairpersons and secretariats is then based on this standard.

**FIGURE 3.2**  
**Standards development value chain**



Note: NSB = national standards body; TC = technical committee.

Internal work instructions—aligned with the “standard for a standard” and based on the principles of ISO 9001, for example—are also indicated to further engender trust in the integrity of the standards development system.<sup>6</sup>

Standards used to be marketed in hard copy. The trend, however, is definitely moving toward electronic systems such as online information and sales. Hence, NSBs that fail to embrace modern information technology (IT) systems for standards information and sales lose out. However, online information and sales must be structured in such a way that the copyright of standards is not violated. Read-only mechanisms for standards before they are purchased are being developed by a number of the more advanced NSBs to help clients. Hard-copy sales are still important in economies where the average small or medium enterprise (SMEs) has difficulty in accessing the Internet. In this case, print-on-demand systems are much more efficient than the printing of a large volume of standards that inevitably have to be scrapped a few years later because of revision.

The NSB should operate a standards information service. This service should provide information on the national standards and relevant international and regional standards on request. The request could be telephone- or email-based or made in person by walk-in customers. The standards information service is frequently also designated as the WTO TBT Agreement national inquiry point by the government if the country is a member of the WTO.

### 3.3 PRIVATE STANDARDS

A vast array of normative documents are lumped together under the generic label “private standards.” Generally, a normative document developed and published by an organization outside of the “recognized” SDOs at the national, regional, or international level is considered to be a private standard. There is not only a vast range (and growing number) of private standards, but also significant

differences in the bodies or organizations that develop these standards related to such aspects as governance, development approach, stakeholder engagement, transparency, consensus, and so on.

The reasons for the rise of private standards are manifold, but typical issues are the following:

- The “time to market” for international standards would be at least two to three years, and that is too long for the sponsors of a standard in fast-moving technologies, who then develop a private standard among themselves in a much shorter time.
- Consortiums may develop a private product standard to gain a market advantage over rivals.
- Global brand producers and retailers increasingly require their suppliers to comply with certain social, environmental, and safety norms as they respond to pressures from their customers. These norms are then formalized in private standards, guidelines, or principles that their suppliers have to comply with contractually.
- NGO movements wishing to promote specific social and environmental changes end up developing private standards and establishing certification schemes to foster their goals.
- Multinational certification bodies identify a specific market niche, develop a private standard, and implement a multinational certification scheme as a sound business proposition.

Whatever the reasons for developing a private standard, such standards have become an important factor in accessing the developed markets of Europe and the United States, and they are also spreading into the markets of East Asia. A final—but still embryonic—trend relates to the harmonization and benchmarking of private standards as a response to the overwhelming growth in their number and variety as well as pressures from suppliers on purchasers to harmonize requirements. Yet, notwithstanding this multiplicity of private standards, new ones continue to emerge on a regular basis (UNIDO, Norad, and CBI 2010).

### **3.3.1 Private standards in the ICT sector**

In addition to a hierarchy of public international, regional, and national standards, it has long been recognized that another layer exists in the form of industry or company standards used within or between companies or in contractual arrangements with suppliers. In response to such industry interest in setting its own standards, a phenomenon emerged in the late 1980s and early 1990s of consortiums and forums, principally in the field of information and communication technology (ICT), to develop industry specifications.

In many instances, the first consortiums and forums were closed groups formed by ICT companies to develop specifications that the participants could then implement principally to compete with rival approaches in the marketplace. Such groups were not necessarily seeking to engage with all interested parties, nor were the specifications they produced systematically made available for public inquiry. Typical examples include the Video Home System (VHS) (by Victor Company) and Betamax (by Sony) formats for magnetic tape video systems in the late 1970s; the Advanced Video Coding High Definition (AVCHD) format for digital video systems (by Panasonic and Sony); and many more.

Over time, however, many of these groups have become more open, have achieved recognition in the ICT industry, and have seen certain specifications that they developed become widely recognized as de facto international market standards—for example, the compact disc (CD) and Global System for Mobile communications (GSM) standard for cell phones. The standardization bodies could not ignore these developments and sought to engage with the ICT industry. One result was that the ISO and IEC Joint Technical Committee on Information Technology introduced a special procedure whereby specifications developed by consortiums and forums could be processed through the public standardization system to be transformed into international standards from the ISO and IEC (ISO 2010).

### **3.3.2 Private standards in the retail and agrifood industries**

In many respects, the emergence of private standards in the agrifood and retail sectors has parallels with earlier experiences in the ICT sector, even if the motivations are not the same. A typical example is the Global G.A.P. (previously EUREPGAP) standards—an independent certification system for Good Agricultural Practice (GAP)—used by retailers in the EU to manage their suppliers over and above the requirements imposed by the EU food safety directives. These initiatives tend to be managed by groups of leading companies.

Although such standards may benefit from a high level of expert industry input, they do not necessarily adhere to the same principles as those of a public international standardizing organization (that is, the WTO TBT Agreement’s principles of transparency, openness, impartiality and consensus, and so on), nor are disciplines of the WTO TBT Agreement annex 3 (Code of Good Practice) necessarily used (ISO 2010).

Concerns have been expressed—especially by low- and middle-income countries, at the WTO Committee on Technical Barriers to Trade (TBT) and the Committee on Sanitary and Phytosanitary (SPS) Measures—that these private standards at times exceed requirements that are established in international standards developed by the CAC, for example, and that the private standards and their implementation therefore constitute an unnecessary barrier to trade. Although the two WTO committees were generally sympathetic to low- and middle-income country complaints, nothing much transpired because none of the private standards was seen as a technical regulation.

But the retail food industry also felt the need to bring some order to this chaotic and potentially cost-inefficient situation. For example, the Global Food Safety Initiative (GFSI) was formed in 2000 at the request of food retailers’ chief executive officers (CEOs) to promote continuous improvement in food safety systems and to ensure confidence and consistency in the delivery of safe food to consumers, while at the same time benchmarking and harmonizing the requirements of a plethora of private standards that had evolved until then.

### **3.3.3 Private standards for social and environmental goals**

Perhaps the most diverse landscape of private standards relates to social and environmental objectives, often with associated claims, certification, and labeling programs. These private standards address such subjects as carbon footprint; eco-labeling; sustainable management of natural resources (forests, fisheries, biofuels, and so on); fair trade practices; organizational accountability; and social responsibility.

These private standards are produced by an array of private standards developers, from retailer consortiums for their private-label schemes to NGOs' movements promoting specific social and environmental changes through their standards and certification activities. The standards development practices of these organizations vary widely. Certain efforts have been made in recent years to improve the consistency of principles and criteria supporting such development activities as well as any associated conformity assessment programs such as certification or labeling (ISO 2010).

In recent times, the public standardization system has helped to consolidate a number of subjects previously addressed only by private standards by providing some important international standards on key social and environmental subjects, as in these examples (ISO 2010):

- *Environmental standards.* In the environmental area, the ISO now provides international standards addressing such subjects as environmental management (for example, ISO 14001); environmental labeling (ISO 14020); life-cycle assessment (ISO 14040); greenhouse gas measurement, verification, and validation (ISO 14064); and drinking water and wastewater services (ISO 24510).
- *Social responsibility standards.* The ISO established a comprehensive stakeholder engagement effort to develop the new ISO 26000 standard on social responsibility. This high-profile project, involving more than 400 global experts from 91 countries and 42 international governmental and nongovernmental organizations, demonstrated how the international standards development process can address complex societal and sustainability issues.

### 3.3.4 The future of private standards

Private standards are here to stay, but many eventually do migrate into public standards under certain circumstances:

- Private standards frequently predate standards developed by public consensus-driven processes, but they are converted into public standards once their market relevance is demonstrated or when the marketing advantage of the consortiums publishing them has diminished.
- Private standards generally cannot be used in technical regulation, because they often do not meet the WTO TBT Agreement requirements regarding the principles of standards development. Hence, if they address market failures that governments wish to manage, they have to be moved into the public standardization system before they can be used as the basis for technical regulations.
- Finally, when the market realizes that the plethora of private standards covering the same products and their concomitant certification processes actually add unnecessary costs, the public standards developers are often persuaded to act as the honest broker to develop a harmonized standard for all to use.

In spite of these tendencies, the use of private standards may still increase in the future. The reasons are manifold, but a few are worth mentioning. The process for developing the private standard is faster than for public

standards when it is managed by a specific industry sector or scheme owner that relies on the scheme, is tailored to specific needs, and includes innovation on an exclusive basis. It is the latter that is often overlooked. Public standards are publicly available for all to see and implement without exclusion; hence, patented product or system elements cannot be included in principle. In schemes based on private standards, on the other hand, scheme owners are able to include such elements, thereby enhancing the value of the scheme for themselves. The scheme owners may wish to protect their patent rights—rights they may have to relinquish if the patented technology is included in a public standard.

### 3.4 GOOD STANDARDIZATION PRACTICE

#### 3.4.1 What is “good standardization practice”?

Good “operating” practice is a strategic management term. More specific uses of the term include good agricultural practice, good manufacturing practice, good laboratory practice, good clinical practice, and now also good standardization practice. Generally speaking, a good “operating” practice is a method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things.

Standards are developed and published at the national, regional, and international levels by many bodies, which in general prepare their documents by consensus processes. Driven by the growth of international trade and technological cooperation, standards bodies have developed procedures and modes of cooperation that are commonly considered to constitute good practices for standards development at all levels. Some of these have been codified in international agreements such as the WTO TBT Agreement; others in standards such as “ISO/IEC Guide 59: Code of Good Practice for Standardization” (ISO and IEC 1994); and many are found in the intrinsic knowledge bases of standards bodies all over the world—all of which are collectively known as good standardization practice (GSP).

#### 3.4.2 Principles of good standardization practice

The origin for determining the principles of GSP is the “Decision of the Committee [on Technical Barriers to Trade] on the Principles for the Development of International Standards, Guides and Recommendations with Relation to Articles 2, 5 and Annex 3 of the [WTO TBT] Agreement” (WTO 2000). This decision enumerates six principles that international standards must comply with before they would be recognized by the WTO as such:

- Transparency
- Openness
- Impartiality and consensus
- Effectiveness and relevance
- Coherence
- Development dimension

The ISO has augmented these six principles by adding another three:

- Stakeholder engagement
- Due process
- National adoption or implementation of international or regional standards

These nine principles, although initially developed for international standardization, are now routinely also used in defining GSP at the regional and national levels. The derived principles for the NSB are discussed in the subsections below. Details regarding international standards can be gained from the relevant WTO TBT Agreement and ISO publications (ISO 2010; ISO and IEC 2005, 2018; WTO 2000).

***GSP principle 1: Transparency***

Transparency is about (a) shedding light on rules, plans, processes, and actions; (b) knowing why, how, what, and how much; (c) officials, managers, and technical committee members acting visibly and understandably as well as reporting on their activities; (d) people outside the system being able to hold those inside accountable; and (e) increasing trust in the people and institutions on which standardization depends.

All essential information regarding the development and publication of national standards must therefore be publicly available in a way that is easily accessible. The Internet has made this much easier than it was a decade or two ago, when information had to be provided in hard copy. The issue, however, is that the website of the NSB must be kept up-to-date continuously. Information that should be readily available to any interested party includes the following (ISO 2010; ISO and IEC 2005, 2018; WTO 2000):

- *The updated work program* must be available at least once every six months in accordance with the WTO TBT Agreement's annex 3 obligations. It would actually be even better if it is updated monthly to take into consideration changes in the work program that have been necessitated by more recent market or regulatory needs.
- *Technical committee establishment information* should be available. Once a new technical committee is to be established, the NSB would normally send invitations to participate to all those interested parties it knows. The NSB should also make the establishment of the new technical committee known on its website for those interested parties that it may not have on its books.
- *Draft standards* have to be circulated for public comment for at least 60 days in accordance with the WTO TBT Agreement's annex 3. The WTO Committee on Technical Barriers to Trade agreed a few years back that in view of the increased use of the Internet, the time could be curtailed to 45 days. Good practice is to post a notice for comment that includes the title and scope of the draft standard and the rationale for its development. The full text should not be posted. The full text should be made available to interested parties on request. A small fee may be charged, but then all should pay it.
- *Approved standards* need to be published promptly after their approval. It is not useful to have standards waiting for weeks and months for publication, whatever the excuse for such delays would be.

It is recognized that the publication and communication of notices, notifications, draft standards, comments, adopted standards, or work programs electronically (via the Internet, where feasible) can provide a useful means of

ensuring the timely provision of information. At the same time, it is also recognized that the requisite technical means may not be available in some cases, particularly with regard to low- and middle-income countries. Accordingly, it is important that procedures are in place to enable hard copies of such documents to be made available upon request.

***GSP principle 2: Openness***

Openness is about giving interested parties meaningful opportunities to participate in policy development and in all stages of the standards development process. Because the NSB's governance structures are fairly small, the voice of the masses regarding the need for standards is frequently not heard. Many NSBs have therefore established a standards advisory forum or similar mechanism that meets once or twice a year where all interested parties can voice their needs.

The NSB may get requests from a variety of sources on new standards to be developed. It is important that, no matter the source, the NSB consider all the requests at the same level, without discarding a request out of hand because it emanates from an unknown source or a small operator. All requests should be evaluated in accordance with formal criteria, after which a decision is made to proceed or not. If the decision is not to proceed, the NSB should provide the requester with the rationale as to why not.

Membership of technical committees should be open to all interested parties who wish to participate. The NSB has the obligation to try to balance representation such that one specific party does not totally dominate the proceedings. On the other hand, denying membership to any interested party just because the NSB would consider the committee to be too large is also not a good way of handling the situation. Even if the technical committee starts out with a high number of participants, anecdotal evidence would suggest that it will soon settle all by itself into a manageable size.

Comments on draft standards from all sources, even the most unlikely ones, should also be considered when collating them for discussion by the technical committee.

Finally, the NSB should have an appeals procedure in place for interested parties who are unhappy with the decisions of the technical committee or the standards approvals committee. High-level appeals should be heard by the council or board of the NSB.

***GSP principle 3: Impartiality and consensus***

Impartiality is about evenhandedness or fair-mindedness. Furthermore, decisions should be based on objective criteria rather than on the basis of bias, prejudice, or conferring the benefit to one person over another for improper reasons. The standards development process must therefore not give privilege to or favor the interests of a particular supplier or product, and standards must be developed through a process of consensus that seeks to take into account the views of all parties concerned and to reconcile conflicting arguments (ISO and IEC 2004a).

Achieving a consensus is at the heart of good standards development practices. This is not always easy, as there are sometimes strong opposing views among the interested parties and technical committee members. These are usually not so much based on technicalities, but on the economic impact a national standard might have on the one or the other stakeholder. These could be between industrial competitors, between consumers and suppliers, between regulatory authorities and suppliers, or many others with conflicting interests.

It is a challenge for the skills of the NSB staff and the technical committee chairperson to find common ground that all can support. The NSB and the chairperson of the technical committee should be seen as totally impartial in such debates and confrontations; otherwise, the credibility of the whole process and the standard to come out of it will be compromised. Effective training programs for technical committee chairpersons and secretariats are essential in this respect.

***GSP principle 4: Effectiveness and relevance***

National standards must facilitate trade, prevent unnecessary trade barriers, not distort the market, respond to regulatory and market needs, and take technological development into account. To address all of these requirements, standards should meet the following criteria:

- Standards should be based on performance criteria wherever possible rather than on a definitive description of characteristics, even if this seems to be a worthy attribute to be included. Technology develops, and such development may be stifled if the standard is prescriptive regarding characteristics, whereas new technologies can be tested against performance requirements.<sup>7</sup>
- The latest technology should be considered in the development of the standard, even though standards are mostly based on proven technology.
- It is important that the standard meet demonstrable market and regulatory needs. If not, it will not be used, and the resources spent on developing the standard would have been wasted. Hence, such demonstrable needs should feature strongly in the decision making of whether to develop the standard.
- GSP suggests that published standards be reviewed at least once every five years. In some technologies that develop quickly, even this may be too long. Some standards may not change; for example, a standard for a brick may have not changed in decades, but it is still useful to review the standard to consider modern advances for its performance. If nothing has changed, the standard is reaffirmed. If things have changed, the standard could be amended, revised, or sometimes even withdrawn if it is no longer in use.
- A meaningful liaison with international and regional standards organizations and using their standards as the basis of national standards, even adopting them without change, can go a long way toward keeping the national standards effective and relevant.

***GSP principle 5: Coherence***

Coherence is the quality of being logical and consistent to form a unified whole. For national standards, this means that conflicting national standards must be avoided. It is a principle that is not always followed. Coherence becomes more difficult to achieve if the NSB manages many technical committees, with the scopes of some very close to those of others. For example, one technical committee is looking at a standard for a washing machine, whereas another technical committee is looking at the electrical safety of household appliances. If the NSB is not careful, both may end up including safety requirements in their respective standards that may differ.

Second, if the NSB has “recognized” a number of SDOs, it can happen quickly that an SDO and the NSB are both managing technical committees whose scopes of activity overlap ever so slightly or even totally. This can lead to a situation where two differing national standards for exactly the same commodity are being developed—for example, a national standard for bottled water developed

by the Ministry of Health, on the one hand, and a standard for potable water developed by the NSB technical committee, on the other hand.

It is the responsibility of the NSB to ensure that the body of national standards is coherent and that overlaps are avoided at all cost.

***GSP principle 6: Consideration of the development dimension***

Constraints on less-developed interested parties, especially SMEs, should be taken into consideration. In almost all countries, SMEs and consumer organizations battle to participate effectively in the standards development processes because they lack adequate resources, such as funds and knowledge, for such participation.

The NSB should find innovative ways to facilitate and support the participation of such less-developed interested parties in standards development, such as through financial support, special capacity-building programs, and other means, depending on the customs and practices of the country. It may be useful to exchange experiences of such programs, similar to the exchange of national approaches in workshops arranged by the WTO Committee on Technical Barriers to Trade.

***GSP principle 7: Stakeholder engagement***

Stakeholders are the lifeline of NSBs, and they should be given meaningful opportunities to participate in policy and standards development. Nearly all of the principles of GSP are underpinned by stakeholder engagement. You need to engage people to get them to become part of the process, and this often requires many promotional or outreach activities making them aware of the benefit and application of standards. They need to be convinced: “What’s in it for me?”

The NSB needs to be seen as a friend of industry able to support its development, as the protector of consumer interests, and as a valuable partner of the regulatory authorities—the honest broker. All of this can be achieved only if the NSB consciously, continuously, and honestly engages with all stakeholders. This does not happen overnight; it is a position that is earned over time.

There are many ways to engage with stakeholders; some are universal, and others are country-specific. On the overall work program for developing standards, a standards advisory forum or standards liaison forum are good constructs to engage with a wider stakeholder group. Regarding national standards, focused stakeholder engagement starts with specific invitations to participate in technical committees, continues with specific invitations to comment on draft standards, and can be highlighted with sector-specific workshops to present new standards to stakeholders.

Some specific approaches to stakeholder engagement that should be considered by the NSB regarding standards development include the following:

- The engagement of stakeholders in the standardization process is an essential part of the process, and the earlier that stakeholders can be engaged in new work items and new fields of activity, the more effective the consultation on the proposals for new work will be. This will enable all stakeholders to learn about new proposals for standards and provide valuable feedback to the NSB.
- It is important that technical committee structures be constituted with experts and delegates who are adequately qualified and equipped for the task, broadly representative of all those stakeholder groups with a legitimate interest in the project, and conscious of its potential impact. It is important that the

NSB and the committee leadership identify potential gaps and thereafter approach relevant organizations to nominate experts to the technical committee.

- It should not be assumed that the same diversity aspects will apply to any or all technical committees. For technical committees addressing subjects requiring broader public-interest engagement (for example, in terms of national economic status, geographic diversity, gender, and so on), the appropriate participation diversity will lead to more credible standards development. These elements of diversity should be identified as early as possible at the outset of a new project or in the technical committee.
- It is recommended that NSBs use national networks for consultation and discussion during the standards development activities and support these where possible at the national level to strengthen the input at the technical committee level, especially when engaged in international standards development. In certain subject areas requiring enhanced stakeholder engagement, for example, an informal network of NSB and stakeholder forums could be used to have a dialogue with broader stakeholder groupings on key areas of importance and in advance of technical committee meetings.

***GSP principle 8: Due process***

Due process in standards development means that all the steps along the whole standards development value chain are provided for in a known and formal way. This provides for clarity and consistency in the process and goes a long way toward building trust in it. Many NSBs have developed and published a national standard in which these steps are described, referred to as a “standard for a standard.” In many cases, this national standard is made available free of charge, thereby enhancing the transparency of the process even further.

The “standard for a standard” would describe broadly how a project to develop a standard is approved; how the technical committee is established; the basic steps of standards development; and the process for editing, circulation for public comment, final editing, approval, and publishing. Also included would be the appeals process at various levels. The “standard for a standard” would mostly deal with principles and broad process steps.

The detailed work instructions for NSB personnel should be contained in the quality management documentation of the NSB. Using the principles and requirements contained in ISO 9001 (“Quality Management Systems—Requirements”) is a useful idea.

***GSP principle 9: National adoption or implementation of international and regional standards***

National standards should form a coherent system with international and regional standards; otherwise, they could be experienced as unnecessary trade barriers. The WTO TBT Agreement therefore suggests that national standards should be based on international standards as much as possible to facilitate such cohesiveness.

This means, however, that the NSB should do everything in its power to persuade its technical committees to adopt international standards with as little change as possible. Sometimes local industry does not like this idea and tries to create hidden trade barriers for imported products by having a national standard, especially if it is to be used as the basis of technical regulation, differing

from the international standard without technical reasons. This recommendation does not preclude changes that are based on solid technical evidence, such as a larger voltage variation in electricity supply (for example,  $\pm 10$  percent instead of 5 percent in the international standard); major climatic differences (hotter climates versus cooler climates identified in the international standard); and so on.

The NSB must work hard to counter this ill-advised tendency. If the country participates actively in international and regional standards development and the national mirror committee is fully involved in the process, such tendencies are less likely to occur.

### 3.4.3 Compliance with GSP

Ever since the implementation of the WTO TBT Agreement, with its obligations on development of standards, and subsequent pronouncements of its Committee on TBT on principles that international standardization should comply with, the focus on GSP has intensified at the international level, now spilling over to the national level. The use of standards has become more pervasive in world trade, resulting in market pressures on standards bodies to perform better and be “quick to market” with appropriate standards.

Hence, some standards bodies are seriously looking for ways and means to become more effective and efficient. Other standards bodies that have been operating standards development and publication systems for many years may have grown complacent in their customs and practices, which may not be compliant with GSP any longer. Then there are standards bodies that have just recently been established, are still in the process of developing appropriate processes for standards development and publication, and are seeking guidance in this respect.

In all of these situations, standards bodies would do well to consider modern GSP and to evaluate their practices against it. By doing so, they can establish, renew, and maintain their standards development and publication practices and have them conform with modern GSP, resulting in more effective and efficient practices. The need for knowledge about GSP can therefore be considered universal; that is, all standards bodies, from the smallest to the most advanced, will benefit from training staff in GSP.

## 3.5 OTHER NORMATIVE DOCUMENTS

The NSB’s primary responsibility is to have national standards developed and to publish them. Many standardizing bodies (such as NSBs and SDOs) have found that this is not enough to satisfy the demand for informative or normative-type documents emanating from industry and society. Hence, quite a few standardizing bodies are also providing types of documents that cannot be classified as national standards because they fall short of the openness, transparency, and consensus principles underlying standards development. Typical of these types of documents are the following:

- *Normative-type documents* developed by an appointed working group but that have not been subjected to the rigorous consensus and public comment routines. They do, however, provide good practice recommendations on

the chosen subject matter. The ISO/PAS and IEC/PAS (Publicly Available Specification) or the ISO/TS and IEC/TS (Technical Specification) series are typical examples of such documents.

- *Implementation guides* developed and published by the standardizing body to help organizations implement a specific national standard—for example, guidance for the SME sector on the implementation of ISO 9001 (“Quality Management Systems—Requirements”) or ISO 14001 (“Environmental Management Systems—Requirements with Guidance for Use”).
- *Collections of national standards with guidance notes on a specific sector*—for example, all the national standards published for automotive safety or building and construction.

There can be many more examples of such informative and normative-type documents depending on the needs of the industry and society in a specific country, and it is the more progressive NSB that will be able to identify these needs and do something about them. The NSB should, however, make certain that these documents are not perceived as national standards; their numbering and titles should make it clear they are not.

### 3.6 STANDARDS INFORMATION: FREE OR TO BE PAID FOR?

Standards are useful only if they are implemented by industries, authorities, and society. This means, however, that their existence and content have to be made available to interested parties in the most effective and efficient way. In this respect, the Internet has had a massive influence in recent times on the ease with which standards can be searched for and obtained.

The ISO and IEC international standards are protected by copyright, and the ISO and IEC shield this copyright as a matter of principle. These organizations argue that standards fall within “intellectual property” as defined by the World Intellectual Property Organization (WIPO). Furthermore, making them available free of charge will deny the ISO and IEC as well as the NSBs adopting them as national standards useful income to fund further standards development. Most other international standards bodies do not have such measures in place, and their international standards can be obtained free of charge, even though many also urge users not to misuse this freedom of information.

It has also been argued by many low- and middle-income countries that because governments fund the development of national standards, these national standards should be available freely as a public good. This argument is given even more weight when standards are referenced in technical regulation, because in many countries, legislative text has to be “freely available” to any interested party as a fundamental right. But the understanding of what “freely available” means differs from country to country.

Both sides of the argument have merit, but generally speaking, national standards have to be paid for. A number of measures have been implemented by the ISO, IEC, and NSBs to protect the copyright yet make it easier for interested parties to view standards before purchasing them and to limit purchasing costs. Some of these measures include the following:

- *Reduced cost of adopted ISO or IEC standards.* The cost of a national standard as an adoption from an ISO or IEC standard may be a fraction of the

cost of an original ISO or IEC standard. Both the ISO and IEC accept such practices but urge a limit on the reduction. In the ISO's case, its copyright policy (POCOSA) that members have to adhere to provides guidelines in this respect.<sup>8</sup>

- *Digital rights management (DRM)*. There are currently a number of different DRM techniques in use to protect standards from copyright abuse, and more are being evaluated. Embedding digital watermarks is one of the techniques chosen by the ISO and IEC. Other techniques preventing files from being altered, shared, or copied have also been implemented by ISO or IEC members in the context of specific offerings like pay-per-view or subscription services.
- *Incentives and other options to exploit the content of standards to abide by copyright*. Making the legitimate versions of standards more desirable and useful than copies is a method being employed by a number of distributors of international and national standards. The ISO and IEC and their respective members are offering many different options to companies and standards users to legally use the content of standards—for example, making additional electronic copies; printing multiple copies from one electronic file; extracting parts of a standard for inclusion in the company's internal documentation, user's guide, or manuals, and so on.

Standards are now generally accepted as intellectual property, and their copyright protects the ownership and identity of the standards body. But at the same time, standards bodies are committed to making sure standards are implemented as widely as possible and that users can make appropriate use of the standards they need. Therefore, the price of standards is set at a level appropriate for their intended users, and this may differ from country to country. For example, ISO 9001:2015 (“Quality Management Systems—Requirements”) or its national adoption costs Sw F 135 from the ISO ( $\pm$  US\$134); £114 from the British Standards Institution ( $\pm$  US\$148); R 485.64 from the South African Bureau of Standards ( $\pm$  US\$36); and K Sh 2,980.80 from the Kenya Bureau of Standards ( $\pm$  US\$28) at the time of this writing.

The “free” availability of standards referenced in legislation such as technical regulation is more challenging. In the EU, the issue has been solved by maintaining the voluntary character of EN standards supporting the implementation of new directives; that is, the EN standards retain copyright and are sold by the EU standardization bodies, and they are freely available but not available free of charge. In some jurisdictions, where national standards are given a specific legal standing in a standards act or a similar law, the copyright of national standards has been safeguarded by a specific article even in the case of them being referenced in technical regulations. The NSB can then provide the standard to any interested party, albeit with a cover charge, thereby fulfilling its obligation to protect the copyright especially of ISO and IEC standards adopted as national standards.

Most jurisdictions, however, fudge the issue and do not state a specific outcome one way or the other. Theoretically, if the copyright of national standards is not safeguarded, the NSB may not adopt ISO and IEC standards as national standards. The argument also becomes a moot point when referencing ISO or IEC standards directly, as is the case in many countries. Such a reference does not invalidate the copyright of ISO and IEC standards, nor does it make them available free of charge either.

### 3.7 THE ECONOMIC IMPACT OF STANDARDS

Considering the growth of global trade and the necessity of standards in defining product characteristics and quality in individual trade contracts, and as the basis of technical regulation, one can consider the impact of standards to be huge qualitatively (see module 2: Importance of QI Reform and Demand Assessment, section 2.1). *Quantifying* the impact, however, is not so easy. A number of studies have been undertaken over the years to quantify the economic impact of standards both at the national level and on the individual supplier. A few selected examples are given in the next subsections.

#### 3.7.1 World Trade Report 2005

The “World Trade Report 2005,” written by WTO economists, points to the growing importance of international standards and identifies the ISO, IEC, and ITU as the most important of the 50 or so international standardizing bodies known to the WTO (WTO 2005). It explains the increase in standardization activity by, among other factors, consumer demand for safer and higher-quality products, technological innovations, the expansion of global commerce, and the increased concern of many governments and NGOs about social issues and the environment, stating that standards have played an important role in fulfilling these needs. The report deals with three key areas:

- The economics of standards in relation to international trade
- The institutional setting in which standard setting and conformity assessment occur
- The role of WTO agreements in reconciling the legitimate policy uses of standards with an open, nondiscriminatory trading system

#### 3.7.2 German Institute for Standardization: Economic benefits of standardization

The German Institute for Standardization (DIN) was one of the first NSBs that initiated studies regarding the economic benefits of standardization. DIN commissioned a study by the Technical University Dresden and the Fraunhofer Institute in 2000 (DIN 2000). The study—covering suppliers in Austria, Germany, and Switzerland—showed that company standards have the greatest effect on businesses in improving their processes. However, in business relationships with suppliers and customers, industrywide standards lower transaction costs and uphold market position. About 84 percent of businesses surveyed used European and international standards as part of their export strategies. Other significant findings of the study were the following:

- Standards make a greater contribution to economic growth than patents or licenses.
- Export-oriented sectors of industry make use of standards as a strategy in opening up new markets.
- Standards facilitate technological change.

The DIN study was followed by a number of similar studies in other countries that showed the quantitative impact of standards on the GDP of these countries (table 3.1).

**TABLE 3.1 National studies of the effects of standards on economic growth**

| COUNTRY        | PUBLISHER (DATE) | TIME FRAME | GDP GROWTH RATE (%) | CONTRIBUTION OF STANDARDIZATION (%) |
|----------------|------------------|------------|---------------------|-------------------------------------|
| Australia      | SA (2006)        | 1962–2003  | 3.6                 | 0.8                                 |
| Canada         | SCC (2007)       | 1981–2004  | 2.7                 | 0.2                                 |
| France         | AFNOR (2009)     | 1950–2007  | 3.4                 | 0.8                                 |
| Germany        | DIN (2000)       | 1960–1996  | 3.3                 | 0.9                                 |
| United Kingdom | DTI (2005)       | 1948–2002  | 2.5                 | 0.3                                 |

Source: Blind, Jungmittag, and Mangelsdorf 2010.

Note: AFNOR = French Association for Standardization (Association Française de Normalisation); DIN = German Institute for Standardization (Deutsches Institut für Normung e.V.); DTI = Department of Trade and Industry; SA = Standards Australia; SCC = Standards Council of Canada.

The DIN study was updated 10 years later, in which data for every five-year period between 1960 and 2006 were considered (Blind, Jungmittag, and Mangelsdorf 2010). The contribution of standards in 2002–06 was considered slightly lower (0.72 percent) than the 0.9 percent obtained in the first study as the average for 1960–96. The conclusion was that standards have a stabilizing effect on GDP growth corresponding to 0.7–0.8 percent.

It furthermore points out that the positive economic benefits extend well beyond the benefits calculated in the study. These include standards for workplace safety that reduce the number of occupational accidents and lower absenteeism; environmental standards that improve quality of life; security standards that help lower the cost of safety and security systems; and so on. In this manner, standards relieve the burden on the state, thus legitimizing the support of standardization through public funds.

### 3.7.3 British Standards Institution: The economic contribution of standards to the U.K. economy

The British Standards Institution (BSI) commissioned a further study in 2015, 10 years after the DTI (2005) study on the economic contribution of standards to the U.K. economy. The study was conducted by the Centre for Economics and Business Research (Cebr) and was comprehensive, covering 1921 to 2013 (Cebr 2015). The report analyzed the macroeconomic and microeconomic impact of the BSI's consensus-based voluntary standards across the U.K. economy. It concluded that they are a vital part of the strength of U.K. industry and play a crucial and often invisible role in supporting economic growth. Among other findings, the research concluded that standards boost U.K. productivity and improve performance, kick-start innovation, and support U.K. domestic and international trade quite significantly in some sectors. The research also found that investing in standards pays dividends for organizations that use them and that standards always generate more benefits for companies than they cost to implement.

The research highlighted benefits across seven key sectors in the U.K. economy. The most productive sectors use standards the most: Aerospace and defense, for example, increased productivity by 20.1 percent between 2005 and 2014, while the U.K. average was 4.9 percent. The food and drink manufacturing sector saw an increase in turnover by £10.2 billion per year through its use of standards. Standards increased total turnover in all seven sectors studied by £33.3 billion per year.

Of those companies surveyed, 84 percent said that using standards enhances their reputation; 73 percent said that standards allow greater control of environmental problems; 89 percent said that standards help to optimize compliance with regulations such as health and safety legislation; 50 percent said that standards encourage innovation through the diffusion of knowledge; and 70 percent said that standards contribute to improving their supply chains by improving the quality of supplier products and services.

### 3.7.4 Economic benefits of standards: ISO methodology 2.0

The ISO developed a methodology to determine the economic benefit of the use of standards at the company level (ISO 2013). Between 2010 and 2012, the ISO conducted case studies on the economic benefits of standardization in more than 20 countries.

The fundamental point in the ISO methodology is to consider the company perspective: its environment, objectives, business processes, and activities. To describe and analyze the activities of a company in a structured and consistent way, the value chain model is applied. The impact of standards is determined by quantifying the variation caused by the use of standards of the relevant performance indicators over the period of time considered by the assessment. Finally, the impact is converted into monetary terms by translating changes in the operational indicators into contributions to the company's gross profit.

Three key benefits of standardization were identified:

- Standards used to streamline the internal processes of companies contributed 0.15–5.00 percent to earnings before interest and tax (EBIT) or gross profit.
- Standards can be used as a basis for the international expansion of companies by providing a common management framework.
- Standards were used to create or enter new markets, reaching a contribution to the companies' gross profit of up to 33 percent of annual revenue, helping a company to achieve a leading position in its market for at least a certain period of time.

Typical results for the car industry using this approach provided a figure of 1.19–2.05 percent for the contribution of standardization to EBIT (table 3.2). Projecting the impact on the industry's total revenue indicates that the impact of standardization in this industrial sector in 2008 would have been US\$38 billion to US\$55 billion.

The ISO Methodology, available as a toolkit from the ISO, can be used by NSBs, SDOs, companies, and academic institutions.

**TABLE 3.2 EBIT contribution of standards in the global automotive industry, by value chain segment, 2008**

| SOURCE    | RANGE OF AVERAGE EFFECT (%) |             |            |                     |
|-----------|-----------------------------|-------------|------------|---------------------|
|           | R&D                         | PROCUREMENT | PRODUCTION | COMBINED EFFECT (%) |
| OEMs      | 0.017–0.024                 | 1.81–2.58   | 0.56–0.80  | 1.19–1.70           |
| Suppliers | 0.67–0.96                   | 1.37–1.96   | 0.64–0.91  | 1.43–2.05           |

Source: ISO 2013.

Note: EBIT = earnings before interest and tax; OEMs = original equipment manufacturers; R&D = research and development.

## NOTES

1. For a discussion of the WTO TBT Agreement, see module 7: Technical Regulation, section 7.1.
2. See, for example, WTO TBT Agreement Dispute Settlement (DS) 381 of Mexico versus the United States on the issue of dolphin-safe tuna products sold in the United States. The WTO Appellate Body concluded in 2012 that the standard used by the United States (a private standard) did not meet the principles of an “international standard” as contemplated in the TBT Agreement. Hence, Mexico won its appeal against the United States’ “dolphin-safe” measure. For more information, see WTO Appellate Body Report WT/DS381/AB/R: [https://www.wto.org/english/tratop\\_e/dispu\\_e/381abr\\_e.pdf](https://www.wto.org/english/tratop_e/dispu_e/381abr_e.pdf).
3. The WTO TBT Agreement and SPS Agreement both deal with standards and their regulatory implementation—the former in a general way, the latter specifically dealing with sanitary and phytosanitary measures. They are mutually exclusive by definition; for further details, see module 7: Technical Regulation.
4. ISO and IEC standards are protected by copyright. Membership in the ISO and IEC transfers this copyright to the national member (for example, the country’s national standards body [NSB]) and allows for the adoption of the ISO and IEC standards as national standards. In such cases, the ISO and IEC require the protection of the copyright to be extended also to the national standard, and the standards cannot be provided to interested parties free of charge; they have to be sold. An ISO member, for example, signs the Policies and Procedures for Copyright, Copyright Exploitation Rights and Sales of ISO Publications (ISO POCOSA) Agreement to this effect with the ISO.
5. See the WTO ISO Standards Gateway: <https://tbcode.iso.org/sites/wto-tbt/home.html>.
6. ISO 9001 is the international standard specifying requirements for a quality management system. For more information, see <https://www.iso.org/iso-9001-quality-management.html>.
7. For example, dezincification is a major issue for brass water taps. Certain types of water will leach the zinc from the brass metal, resulting in a tap that leaks profusely all over the body within months. It is better to include a test for dezincification rather than specify the minimum percentage of copper in the brass that would prevent dezincification.
8. POCOSA is the abbreviation for the ISO’s Policies and Procedures for Copyright, Copyright Exploitation Rights and Sales of ISO Publications.

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