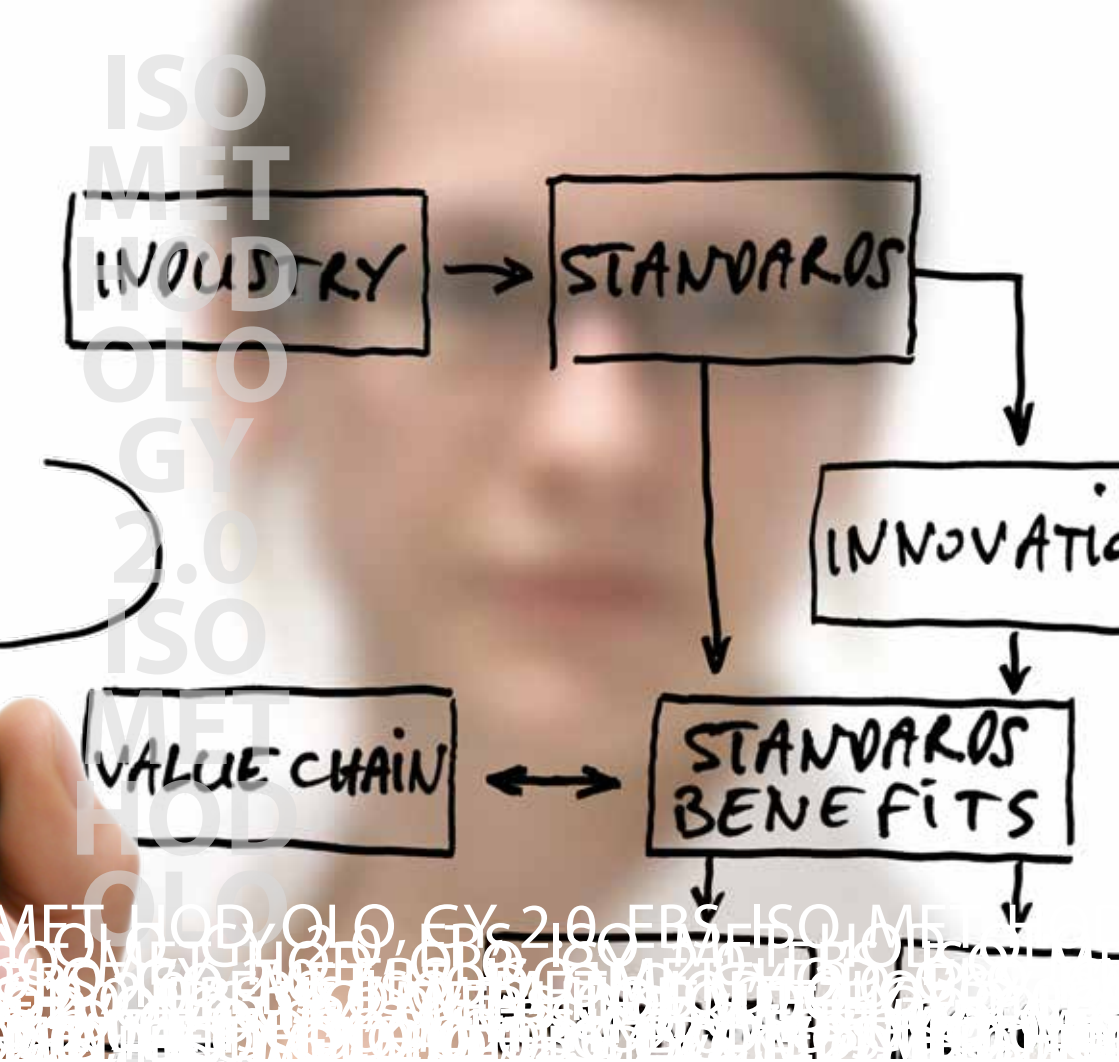

Economic benefits of standards

ISO Methodology 2.0

International Organization for Standardization

International Organization for Standardization

ISO Central Secretariat
1, chemin de la Voie-Creuse
Case postale 56
CH - 1211 Genève 20
Switzerland
www.iso.org

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ISO in brief

ISO is the International Organization for Standardization. ISO has a membership of 162* national standards bodies from countries large and small, industrialized, developing and in transition, in all regions of the world. ISO's portfolio of over 19 600* standards provides business, government and society with practical tools for all three dimensions of sustainable development: economic, environmental and social.

ISO standards make a positive contribution to the world we live in. They facilitate trade, spread knowledge, disseminate innovative advances in technology, and share good management and conformity assessment practices.

ISO standards provide solutions and achieve benefits for almost all sectors of activity, including agriculture, construction, mechanical engineering, manufacturing, distribution, transport, healthcare, information and communication technologies, the environment, energy, safety and security, quality management, and services.

ISO only develops standards for which there is a clear market requirement. The work is carried out by experts in the subject drawn directly from the industrial, technical and business sectors that have identified the need for the standard, and which subsequently put the standard to use. These experts may be joined by others with relevant knowledge, such as representatives of government agencies, testing laboratories, consumer associations and academia, and by international governmental and nongovernmental organizations.

An ISO International Standard represents a global consensus on the state of the art in the subject of that standard.

*in March 2013

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The ISO Methodology

Calculating the benefits

ISO has developed a simple, step-by-step methodology and a robust set of tools to measure the economic benefits of standards. The methodology can be applied to all companies and industry sectors in order to identify the contribution that standards make to their performance.

Step 1: Analyse the value chain

Locate the company's position in the value chain, and the core competences and key activities involved in the creation of value.

Step 2: Identify the impact of standards

Determine the impact of standards on each of the company's main business functions and associated activities. A handy tool is the standards impact map which compiles over 90 examples of such impact by business function.

Step 4:
Collect information and measure impact

The earnings before interest and tax (EBIT) indicator is used as a measure of value created. EBIT accounts for the gross profit of a company (revenue minus costs) at a given point in time.

Step 3:
Determine value drivers and define key operational indicators

Value drivers are key organizational capabilities that give a company a competitive advantage. The most desirable impact should be concentrated here. Operational indicators are used to measure actual impact (e.g. required manpower or customer satisfaction).

Introduction

Background

Since 2000, a significant number of studies have been conducted on the benefits of standardization and the use of standards. However, comparing these studies and reaching overall conclusions is difficult because they were carried out by different organizations, with different objectives and using different methodologies. Most of them, and particularly those with the highest influence [1], followed a macroeconomic perspective, trying to evaluate the contribution of standardization to the economic performance of countries, considering indicators such as GDP growth and productivity increase.

Those studies made substantial progress in understanding the economic impacts of standards. However, they have not, or only marginally, addressed the microeconomic perspective and have not tried to assess the benefit that standards bring to individual companies.

The ISO Methodology [2] was designed to fill this gap. It provides a systematic approach for assessing the economic benefits of standards for individual organizations. It supports companies' internal analyses, the development of case studies and the comparison of results from different studies.

The primary scope of the ISO Methodology is assessing the *economic benefits* of standards (i.e. the contribution of standards to the creation of economic value) **for a company**. The methodology can be applied to the economic impact of standards on an industry sector at national or international level, although this requires particular attention and increased efforts.

The ISO Methodology can also be adapted to describe and quantify the *non-economic* benefits of standards – i.e. the contribution that

1) See the bibliography at the end this document which contains a number of these studies.

2) Developed with the support of Roland Berger Strategies Consultants and further refined during its application in over 20 company case studies worldwide.

standards give to the achievement of social and environmental benefits – from the perspective of an individual organization (irrespective of whether the organization is for-profit, not-for-profit, in the public or private sector).

The methodology is focused on the measurement of benefits resulting from the *use of standards*. The benefits associated with participating in standards development are only addressed at a qualitative level.

This document gives an overview of the ISO Methodology and its objectives. It describes the key stages of the assessment process and provides references to some of the tools which should be applied at certain stages of the assessment. It presents the key elements and concepts of the methodology, including practical advice on the organization of projects, on steps in the assessment process, and on methods to calculate the benefits of standards. Examples from the library of case studies developed so far (December 2012) are given to illustrate the concepts.

The main part of this document is focused on the primary target of the analysis, i.e. economic benefits of standards for companies (for-profit organizations). The assessment of economic benefits of standards for an *industry sector* is covered in Annex A. The extension of the methodology to assess *non-economic* benefits of standards is covered in Annex B.

Potential users

Many organizations and individuals are potentially interested in applying the ISO Methodology, including ISO itself, national standards bodies (NSBs), other standards development organizations (SDOs), companies, other types of organizations that use standards, and academic institutions.

ISO, NSBs and other SDOs, can benefit because the application of the ISO Methodology helps them to address systematically the issue of benefits of standards, with a view to :

- Enabling stakeholders in private as well as public sectors to appreciate better the economic and social impact of voluntary consensus standards,
- Raising the awareness of policy makers and business leaders to the importance of standardization.

Companies and other organizations that are users of external standards can benefit because the application of the ISO Methodology can help them to understand better the impacts of standards on their activities and processes. This may help to improve further their performance and maximize the benefits derived from standards. Companies can use the same approach and tools provided by the ISO Methodology to investigate the impact of internal company standards.

Academic institutions can benefit because the application of the ISO Methodology will help them to develop original case studies and to capture information, for teaching and empirical material for research related to standards.

1

The ISO Methodology in brief

1.1 Key questions

The ISO Methodology addresses the following **core question**:

- What is the **quantitative** contribution of standards to the creation of value by an organization?

Other questions that can be addressed together with the core question are:

- What is the **qualitative** contribution of standards to company operations? This question aims at a clear understanding of other significant benefits of standards that could not be quantified
- How can companies maximize the value contributed by standards?
- Which areas of company operations could additionally benefit from the use of standards?

1.2 What "standards" mean in the ISO Methodology

"Standards" in the ISO Methodology are not limited to standards developed and published by ISO, but comprise all consensus-based standards issued by any standards-developing organization. Companies often call these "external" standards to distinguish them from internal company standards.

"External" standards include International Standards developed by ISO and the International Electrotechnical Commission (IEC), regional and national standards, standards developed by sector-based standards development organizations, as well as consortia standards if the consortia are open to participation by interested parties in addition to consortia members.

Internal company standards are excluded from the assessment except if they are related to or based on external standards. In such cases, the interplay between internal and external standards needs to be

carefully analyzed, because the influence and impact of external standards can be substantial, even if the effect is achieved through internal standards.

As explained in **section 1.3**, it is important to underline that the impacts from internal company standards (even if they are not related to external standards) can also be assessed using the same approach and the same set of tools provided by the ISO Methodology.

Finally, a special note is required for *Technical regulations*, i.e. governmental technical documents that are mandatory and legally binding in certain jurisdictions – in particular, those of countries that are target markets of the company.

The approach and the tools provided by the ISO Methodology can be applied to both voluntary standards and technical regulations.

In principle, if the primary interest is to evaluate the impact of voluntary standards, technical regulations should be excluded from the assessment. However, in reality it is often difficult to distinguish between the two from the company perspective, especially in small and medium-sized companies : in most cases, both voluntary standards and technical regulations are part of the same portfolio of technical documents that companies use in their business practices.

1.3 Basic approach

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 (see **section 1.4**). The impact of standards is then determined as described in **section 1.5**.

Standards used by the company (*all standards* – as defined in **section 1.2**) are considered in relation to the company business processes and specific activities. We need first to identify where, for which activities, standards are used and how these activities, supported by the use of standards, contribute to the creation of value for the company.

Operational indicators associated with the activities impacted by standards then need to be identified to allow quantification. Activities and indicators most closely associated to the company "value drivers" need to be privileged, because they are usually associated with higher added-value.

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 (the main approaches used for such quantification are described in **section 1.6**).

Finally, the impact is converted into monetary terms, by translating changes in the operational indicators into contributions to the company's gross profit.

Extensions to the ISO Methodology towards an industry sector analysis and towards assessing non-economic benefits are covered in Annexes A and B.

1.4 The value chain

The ISO Methodology is based on the value chain approach.

A value chain comprises a sequence of activities to generate a certain output, a product or a service. The output of the work passes through all the activities of the chain in a given order adding value at each stage. The links that form a value chain may be organized inside a single company, or they may be spread over different companies that

cooperate with each other in supply chain networks and that may be located in different countries (see **figure 1**).

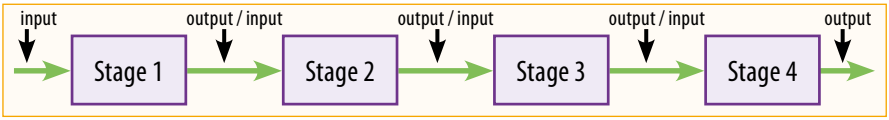


Figure 1 – A simple value chain

1.4.1 Company value chain

A company value chain represents the chain of activities conducted inside a company. The operations of the company are subdivided into a number of key business functions (see **figure 2** with the nine business functions A to I). Each of these functions is associated with a set of specific value chain activities. For example, the activities concerning the production of components and the assembly of final products are undertaken within the " production/operations " business function.

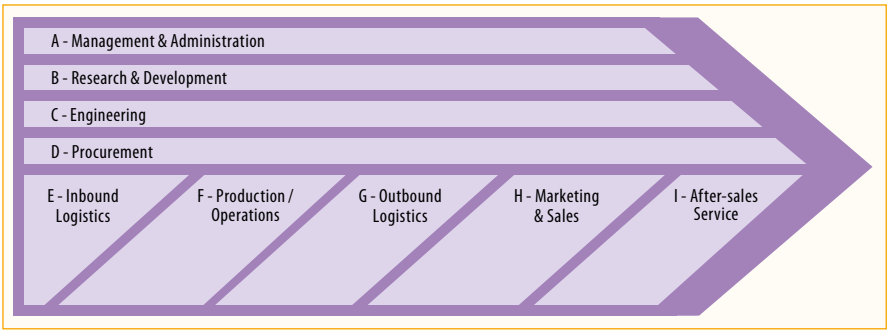


Figure 2 – The value chain of a manufacturing company

The business functions designated as E to I in **figure 2** are named *primary functions*[1)], whilst functions A to D are called support func-

1) " Primary functions " are those dealing with the " core " activities of the company (e.g. for a manufacturing company, all those associated with the transformation of materials into products and their delivery to customers). In a business, they usually represent the " direct costs ".

tions[2]. In principle, all products of a manufacturing company are processed through the primary business functions. Some of these functions may be quite complex and composed of stages, whereas others may be relatively simple. The support functions influence the primary functions and assist in their execution. For a definition of the individual business functions, see Annex D *Terms and definitions*.

The company value chain in **figure 2** is generic, but based on the model of manufacturing companies that, since the late 1980s, have been extensively analyzed in management literature using this approach. The value chain model can also be applied to other types of organizations (e.g. service companies or social institutions), but may require an adaptation to reflect the specific characteristics of the operations of these organizations.

In these cases, the modification concerns mainly the structure of the primary functions, which need to reflect the " core " activities of the organizations. Examples from the case studies are shown in **section 2.**

Further examples for an adaptation of the value chain can be found at Annex B where the value chain model is applied to the description of a hospital.

Figures 3 and **4** summarize the ISO Methodology and identify its focus in the context of the wider supply chain of a company.

2) " Support functions " are all the others (e.g. for a manufacturing company, activities that are not directly related to each unit of product). Their costs are usually considered as " overheads ".

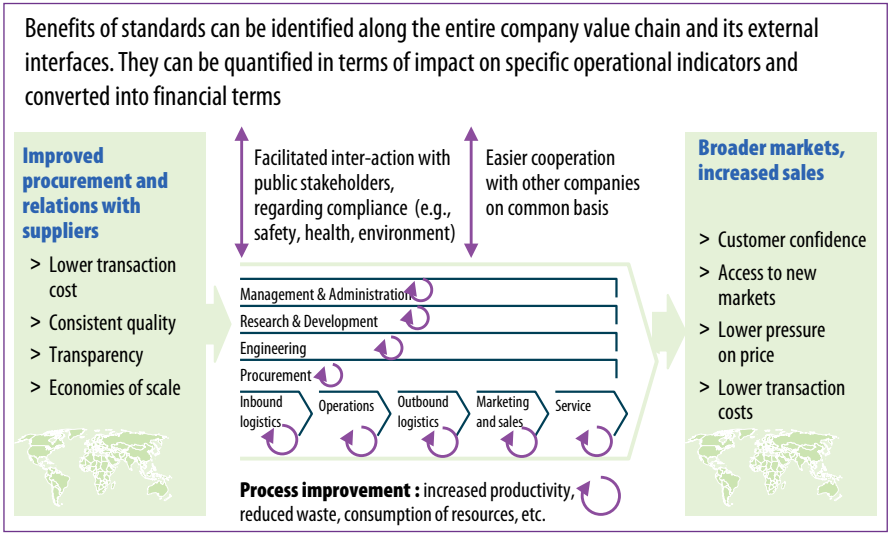


Figure 3 – The ISO Methodology at a glance

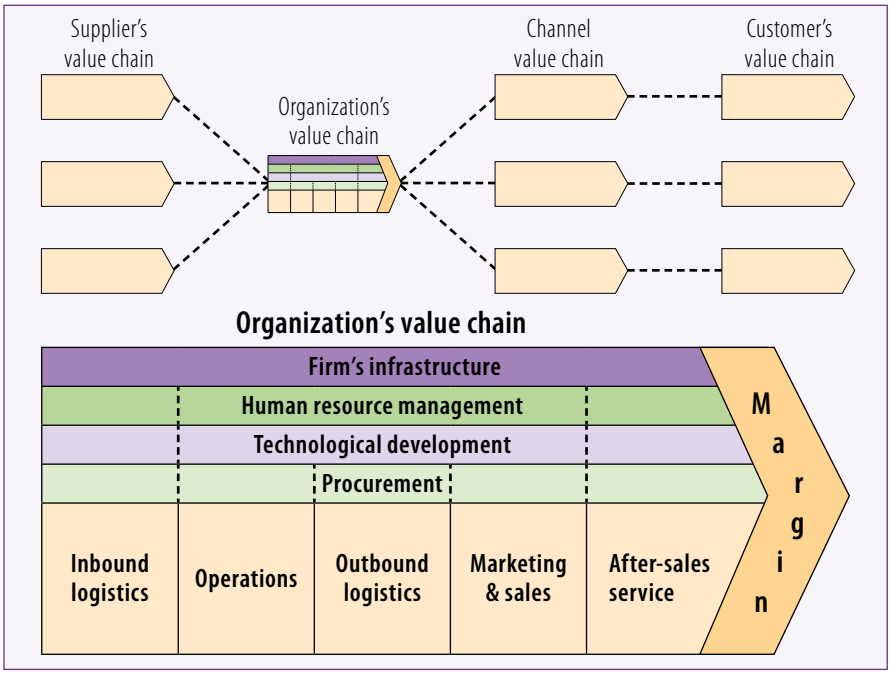


Figure 4 – A company and its value chain embedded in the wider supply chain

1.4.2 Industry value chain

A company value chain, as applied in this methodology and shown in **figure 2,** is limited to the scope of an individual company. However, the value chain model can be extended to a whole industry sector, in which case the various stages of production and services and the network of suppliers and customers are included in the perspective. This is referred to as the "industry value chain" (see **figure 5** giving an example of the *oil and gas engineering industry*).

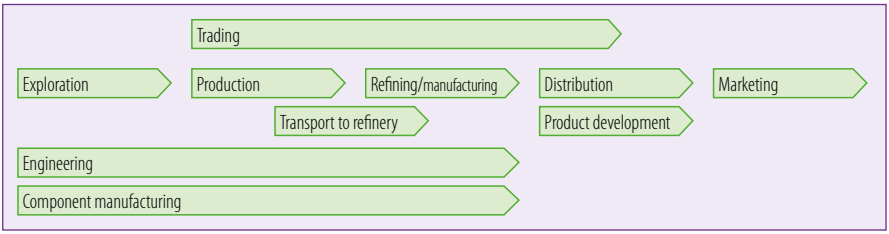


Figure 5 – Oil and gas engineering industry value chain and scope

More generally, an industry value chain can be segmented into different streams and sequences of productive operations that come together and intersect at certain stages. Each of the segments can be occupied by certain types of companies, which, on the basis of certain inputs produce certain outputs and thereby can be located in certain segments of the industry value chain as shown in **figure 6.** Placing a company into the context of its industry value chain helps to understand how it is embedded in a network of interrelated inputs and outputs.

Segmentation of an industry value chain						
Seg_1	Seg_2	Seg_3	Seg_4	Seg_5	Seg_6	Seg_n
						Comp
Comp	Comp	Comp		Comp		Comp
	Comp	Comp		Comp	Comp	Comp
Comp		Comp		Comp	Comp	Comp
		Comp			Comp	Comp
	Comp	Comp				

Figure 6 – Segments of an industry value chain and location of individual companies

1.5 Key steps in the assessment of an organization

The assessment of the impacts of standards proceeds in accordance with the steps below which are summarized in **figure 7.** It is recommended to follow this sequence of steps, although the particular conditions and constraints of each assessment project may require variations. The practical experience has also shown that in most projects it is important to repeat certain steps and to refine the assessment incrementally.

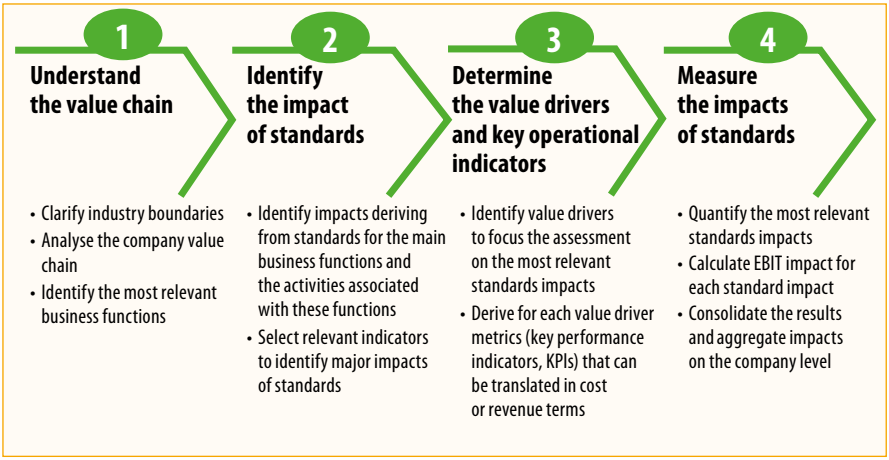


Figure 7 – The ISO Methodology : A four-step assessment process

Step 1: Understand the value chain of the industry and the company

The first step is to determine – at least at a general level – the value chain of an industry and to locate a company in the context of the industry value chain. This is important because it helps to understand the business, to appreciate its boundaries and its relations with suppliers, customers and distribution channels.

Secondly, the internal value chain of the company needs to be understood. It is crucial to understand the company business processes, its organization, and its core value adding activities.

A decision of key importance is with regard to the **scope of the assessment**: should it cover the whole company, or should it be limited to one or more of its business functions ? It may take a few iterations in the analysis until the scope can be finally fixed. The decision on the scope is dependent on factors such as the size and complexity of the company, the available resources for the assessment, the access to key information, the experience of the members of the project team and the willingness of the company to engage in such an assessment.

When a large company is assessed, it is hardly possible to assess the impacts of standards on the company in its entirety. The scope needs therefore to be limited to certain key areas of operations. In other cases, the assessment may include a number of different business units. In the case of a company with several production sites, only one of these sites may be assessed.

Step 2: Identify the impacts of standards

In this second step, the business functions and activities in the company value chain where standards are expected to perform a significant role are determined.

Existing company documentation, e.g. the quality manual, process and organizational charts, other corporate or departmental documentation, should be used to understand processes, business functions and the main activities performed by the relevant business functions. Depending on the complexity of the company, a global list or a function-specific list of the standards used by the company should be used or compiled. Company experts should then indicate which standards (or groups of standards) are applied for which activities within the selected business functions.

In some cases, it might be useful to develop an explicit **process map** showing the main activities undertaken by the company inside a business function and mapping important standards used in the business function to the stages in which they are used. As an example, the main stages in production can be displayed with a process map. The process map allows standards to be assigned to certain stages and types of operations where they are used.

As shown in **figure 8,** standards can be used in particular stages as well as across different stages. This form of presentation allows standards to be located to the stages of the process and to understand for which types of operation they are used.

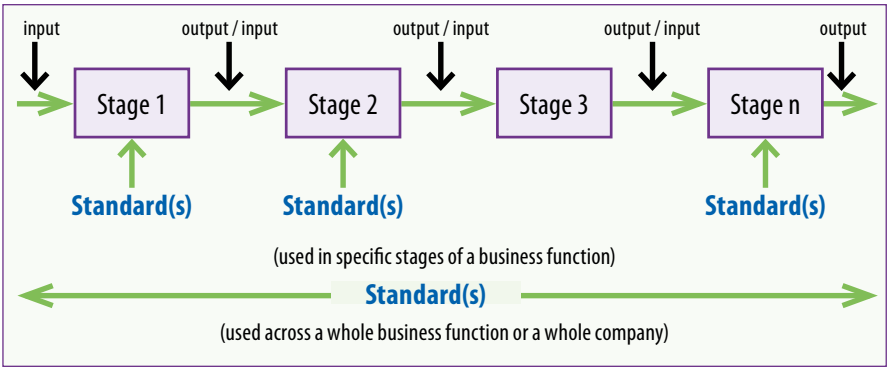


Figure 8 – Process map with an indication of the locations where standards are used

ISO has developed a tool that can assist in the identification of core areas of the company value chain where standards may perform a significant role : the **Standards Impact Map** (see **figure 9** and **table 1)**. The Standards Impact Map is part of the toolbox that comes with the ISO Methodology (see **tool TB_07**).

The Standards Impact Map is a generic check list based on the model business functions that make up the company value chain and the typical activities undertaken in these functions, and indicates potential impacts of standards on these activities.

Listing over 80 types of impacts, the Standards Impact Map can help to generate ideas or to explore possibilities : However, in most cases, specific impacts relevant for the company under investigation have to be determined either by adapting/specializing generic entries of the map, or as a result of the detailed analysis of the company's activities.

It is also important to note that only a subset of the impacts listed in the standards impact map may be relevant for a given project.

Standards Impact Map (Functional Perspective)

Functions	Activities	Impacts	Description
Inbound logistics	All activities	Better internal information transfer	Using standardized documents and specifications makes passing on internal information about products and services more efficient.
		Better training of personnel	Inbound Logistics staff can be trained better because relevant specifications for both products and services are standardized.
		More efficient logistics	Inbound Logistics can be conducted more efficiently due to the reduced number of types of supplies.
	In-house logistics	More efficient receiving of supplies	Standardized documentation, packaging, labels or tags of supplies makes receiving more efficient.
	Warehousing	Reduced warehousing needs	Due to the high availability of standardized products, fewer supplies need to be stored in the warehouse.
Production / Operations	All activities	Better internal information transfer	Using standardized documents and specifications makes passing on internal information about products and services more efficient.
		Better training of personnel	Production/Operations staff can be trained better because relevant specifications are standardized, for both products and services.
		More efficient processing	Due to the reduced number of types of non-standardized products, Production/ Operations can become more efficient.
	Processing	More efficient assembly	Assembly processes are more efficient due to the modular product architecture.
	Quality assurance	Better quality of equipment and supplies	Higher quality of equipment and supplies based on standards reduces the failure rate and related correction costs.
	HSE (health, safety and environment)	Better quality management	Quality management based on standards can be implemented more effectively.
		Reduced disadvantages from regulations	Influence in standard-setting process helps to reduce disadvantages from regulations
		Better health/safety/environmental compliance	HSE management based on standards can be implemented more effectively.
Outbound logistics	All activities	Better internal information transfer	Using standardized documents and specifications makes passing on internal information about products and services more efficient.
		Better training of personnel	Outbound logistics staff can be trained better because relevant specifications for both products and services are standardized.
		More efficient logistics	Reducing the number of product types means that Outbound Logistics can be conducted more efficiently.
	Packing/shipping	More efficient packing and shipping	Standardized documentation, packaging and labels make packing and shipping goods more efficient.
Marketing and Sales	All activities	Better internal information transfer	Using standardized documents and specifications makes passing on internal information about products and services more efficient.
		Better training of personnel	Marketing & Sales staff can be trained better because relevant specifications for both products and services are standardized.
		More efficient marketing activities	Marketing & Sales activities can be conducted more efficiently if there are fewer product types.
	Market analysis, research	Better competitor information	Since competitor's products have standardized specifications, market research can be conducted more efficiently.
	Marketing activities, client development	Better customer information	Communicating product and service specifications and requirements to potential customers is more effective when refering to standards
	Contracting	More efficient contractual agreements	Defined specifications of the company's products and customer requirements makes concluding contractual agreements easier.
	Sales	Higher sales	Sales are higher due to customer confidence in standardized products and services.
		Increased competition	The market share is lower due to more competitors on a market for standardized products and services.
		Reduced time-to-market	For products and services based on standardized components, the time-to-market and market share are higher due to earlier access to technical infor
		Benefits from participating in standard-setting process	A larger market share can be achieved through the promotion of the own technology to become standard and the acquisition of customers
Service	Customer care and technical support	Better internal information transfer	Using standardized documents and specifications makes passing on internal information about products and services more efficient.
		Better customer communication	You can communicate information about products and services to customers more effectively by using standardized specifications.
		Better training of personnel	You can train Service staff better if you have standardized specifications of products and services.
		More efficient customer care	Fewer types of non-standardized products make Service activities more efficient.
		Reduced consultation needs	Improved quality of standardized products means less consultation required.

Figure 9 – Standard Impact Map :
business functions, activities and potential impacts of standards

Function	Activities	Impacts	Description
Production/ Operations	All activities	Better internal information transfer	This section of the impact map contains more detailed description of each of the possible impacts
		Better training of personnel	
		More efficient processing	
	Processing	More efficient assembly	
		Better quality of equipment and supplies	
	Quality assurance	Better quality management	
	HSE (health, safety and environment)	Reduced disadvantages from regulations	
		Better health/safety/environmental compliance	

Table 1 – Extract from the Standards Impact Map – Production function – Structure of the map

Step 3 : Analyze the value drivers and determine operational indicators

This step is divided into the following two sub-steps : a) the analysis of the company value drivers and b) the determination of operational indicators relevant to the selected business functions.

a) Value drivers

Value drivers are crucial organizational capabilities that give a company a competitive advantage. The analysis of value drivers is important because :

- It helps to better understand the company strategy and the activities, within the various business functions, that add value
- If impacts of standards can be assessed in activities closely associated with value drivers, their impact on value creation may be significantly higher than for other activities

The analysis of value drivers can be done at two levels :

Firstly, at the company level, an analysis of the value drivers helps to understand the overall company strategy. Depending on the organization of the project and the involvement of senior management,

the analysis can be performed initially in the framework of the value chain analysis (step 1) and may then be refined in the current step.

Secondly, at the level of the individual business functions, activities can be identified that are more closely connected with the company value drivers and related operational indicators. **Table 2** shows for several business functions examples of the relationship between these aspects :

Business functions	Value drivers	Key activities (using standards)
Research & Development	Excellence in new product design	Collection and company-wide dissemination of information on design technologies
Production	High-performing, flexible production line	Streamlined and well-monitored production process
Marketing & Sales	High market and customer intelligence	Information about market access information and customer preferences readily available

Table 2 – Business functions, value drivers and activities using standards

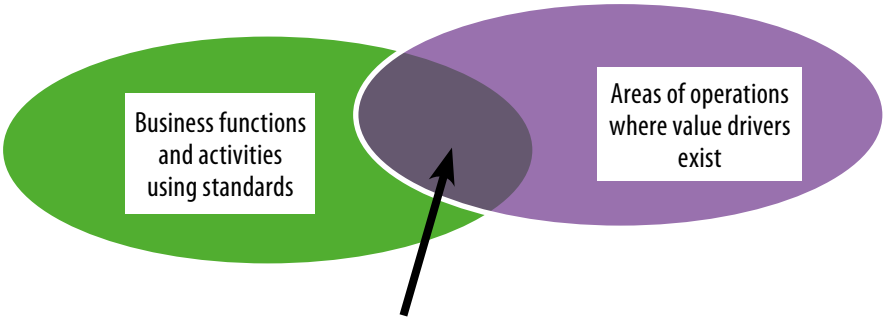


Figure 10 – Intersection : standards contribute and sustain value divers and key activities

Whenever possible, the assessment of the impacts of standards should focus on activities most closely related to value drivers (see **figure 10**). This is because standards will most likely generate the largest benefits for a company when they support value drivers.

However, if such an intersection cannot be found or if it is relatively limited, all other activities which are impacted by standards should be considered as a secondary choice.

b) Operational indicators

To assess the impacts resulting from the use of standards, one or more operational indicators need to be identified.

Operational indicators are measurable variables of company activities that show improvement or degradation of performance. The operational indicators chosen in the assessment need to be relevant, i.e. they need to capture essential aspects of the activities under analysis, and need to reflect the impacts of standards. Whenever possible, they should be associated with the company value drivers.

In general terms, it is possible to distinguish between two broad categories of operational indicators :

- Indicators related to the efficiency of operations
- Indicators related to market development.

Some examples are given in **tables 3** and **4** (for more details, see **section 2)**.

Examples of operational indicators related to the efficiency of operations :

Business functions	Operational indicators	Impacts of standards
Management & Administration	Legal compliance	Due to the use of standards, awareness has been built into management systems so that legal requirements can be easier traced
Research & Development	Manpower	Due to the use of standards, the amount of work needed to develop a new product has decreased. This means that the cost for design engineers (hours × average cost) was reduced

Business functions	Operational indicators	Impacts of standards
Inbound logistics	Non-conformant supplies	Due to the use of standards, specifications for supplies can be met by more suppliers leading to more competition and better quality. This results in lower costs in handling a) rejections and b) product failures. The value is calculated as a reduction of a certain cost over time
Production	Conformant products	Reduced failures result in higher quality output, less re-work and less warranty claims
All business functions	Accidents	Reduced number of accidents and consequent injuries, deaths

Table 3 – Examples of efficiency indicators

Examples of operational indicators related to market development:

Business function	Operational indicators	Impacts of standards
Marketing & Sales	Sales	Due to the use of standards for new or modified products or improvements in production, the company increased sales revenues and profits
	Access to existing markets that are new to the company	By meeting certain requirements stated in standards (regulatory or market expectations), the company can access markets that were previously closed to it
	Creation of new markets	Using certain standards, the company developed markets for a new type of product for which it occupies a monopoly position for a certain time

Table 4 – Examples of market development indicators

The selected indicators may not cover all the impacts of standards on the selected business functions. Nevertheless, if chosen carefully, the impacts that can be determined and quantified for these indicators may be significant enough to prove the degree to which standards influence the operations of the company and contribute to its value creation.

Table 5 relates business function and operational indicators to measure the impacts of the standards used :

Business functions	Operational indicators (examples)	Relevant standards
Management & Administration	Internal company information transfer and access to key information	Internal company processes are clearly defined and information is communicated to staff e.g. ISO 9001
Research & Development		Management system standards and information capture specifications ensure up-to-date information is available e.g. ISO 8000, ISO 9001, and specific technology standards
Engineering	Flexibility in customized set-up of production equipment	Specific technology standards
Procurement	Transparency in supplier relationships and contracting	Technical requirements for supplies are defined by reference to standards wherever possible
Inbound logistics	High degree of fault detection	Standards are used in sample checking of supplies, and in sampling and testing
Production/ Operations	Efficient, flexible processes resulting in high-quality products and services	Standards are used to organize and monitor production processes
Outbound logistics	Fast packaging process and reliable packaging of final products	Standards are used to operate packing and storage processes
Marketing & Sales	Reputation for high quality and diversified product line	Reference to standards assures customers of quality and reliability of company
After-sales service	Effective customer support and responsive complaints handling	Standards are used to establish customer service criteria and processes

Table 5 – Examples of operational indicators and relevant standards for main business functions

The key point to keep in mind is to collect information on operational activities at a level which is as close as possible to where standards are actually used. Examples of leading questions in this process are :

- Has the use of standards had an impact on the inputs needed to perform a given task (e.g. the testing of materials) ?
- If yes, by how much has the amount of inputs used in this task changed due to the use of standards ?

Step 4: Assess and calculate results

The purpose of the whole assessment process is:

1. To quantify the impact from the use of standards through the operational indicators and to aggregate these impacts for each of the selected business functions;
2. To convert the resulting quantities in financial figures, i.e. gross profit, generated by the use of standards for each of the selected business functions;
3. To sum up the figures for all the selected business functions, determining the total contribution of standards. Earnings Before Interest and Tax (EBIT) or gross profit, is used as the key indicator (see **figure 11**).

Economic benefits:
EBIT key measure to assess the creation of economic value

EBIT = **E**arnings **B**efore **I**nterest and **T**ax

It is the key indicator applied for the assessment and is taken as a measure of the company's value creation. EBIT expresses the gross profit of a company, i.e. revenue *minus* cost, at a given point in time.

Figure 11 – EBIT – the key measure to assess the creation of economic value

It is expected that the use of standards leads to a change in the value of the operational indicators for the selected business functions. This impact, converted into financial terms, shows that the value created by the company is increased a) by reducing costs, b) by contributing to higher revenues or c) a combination of both.

For example, "cost savings" for the procurement of materials and components is an operational indicator which is measured directly in financial terms. The reduction of "manpower needed to complete the design of products", however, is an operational indicator that needs

to be converted into estimated cost savings on the basis of average company data for the sector, such as the average cost of personnel with the required qualification, the number of projects, etc.

Likewise, "increased sales" due to the contribution of standards to access certain markets, is another operational indicator measured directly in financial terms. However, it should be noted that to calculate the gross profit generated, direct costs (e.g. for production associated with these extra sales) need to be subtracted from the sales revenue.

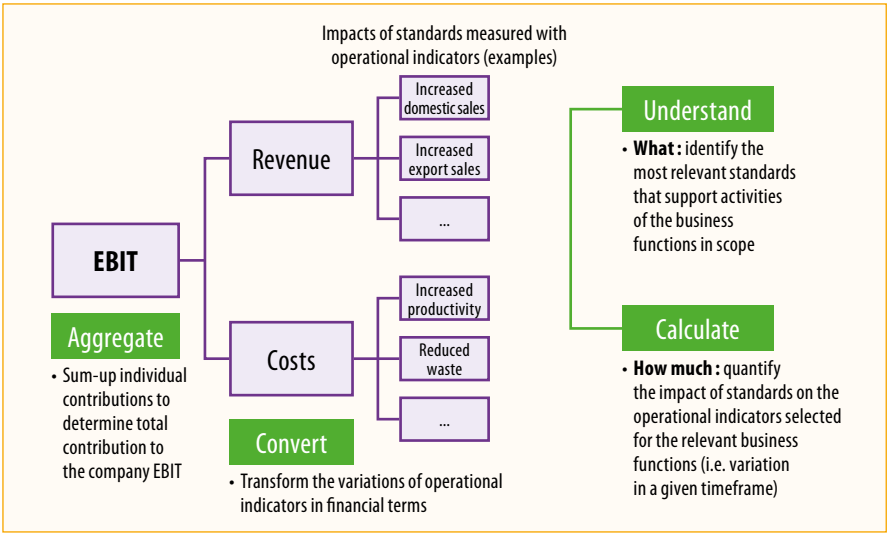


Figure 12 – Measurement of the impacts of standards using operational indicators and converting measured impacts into EBIT contribution

As outlined in **figure 12**, all the data collected for the operational indicators are converted into financial values. The financial values are aggregated to determine the overall impact of the use of standards for the company or the business function(s) being assessed. This final value is the total contribution of standards to the EBIT of the selected company.

Figure 13 highlights the relationship between value drivers, operational indicators applied for the quantification of the impact of standards that contribute either to revenues or costs and how they are then summed up in the overall contribution to the company EBIT.

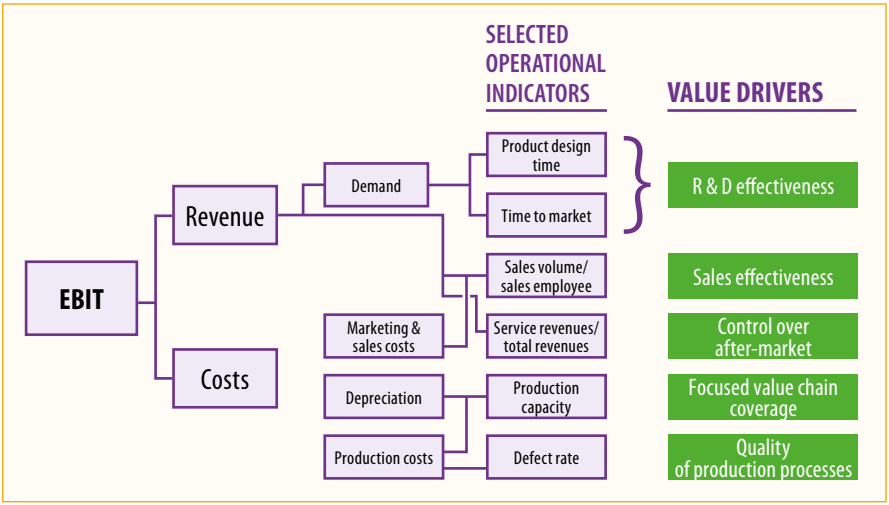


Figure 13 – Analyze value drivers, select operational indicators, measure impacts and calculate EBIT contribution

1.6 Basic approach to measuring the impacts of standards

In general, the approach to assessing the impact of standards consists in comparing a **situation 1** (standards **not** used) with a **situation 2** (standards used) (see **figure 14**).

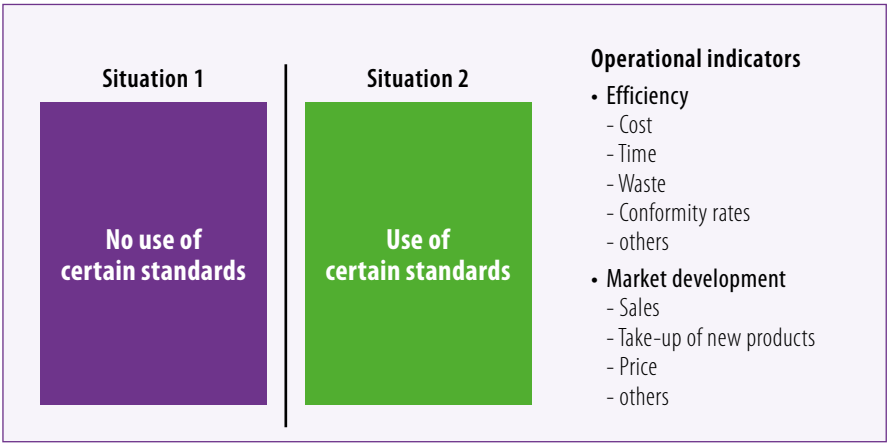


Figure 14 – Basic approach in the assessment : Comparison between situation 1 and 2

1.6.1 Before-after comparison

The simplest case is a **before-after comparison** : An organization may have migrated from a **situation 1** when it did not use standards towards a **situation 2** when it uses certain standards. In such a case, there may be data available for company operations *before and after the introduction of certain standards* which allows to make a comparison and to quantify the impact of the implementation of standards.

The same approach of "before-after" can be applied if a company migrates from using one set of standards (**situation 1)** to another set of standards (**situation 2)**, e.g. by migrating to a new edition of a standard or a set of standards.

In some cases, **situation 1** and **2** can represent snapshots of the conditions at subsequent instances in time ($time_1$ and $time_2$). In other cases, when data is not available for comparable instances in time, data for a **situation 1** or **2** may have to be calculated as an average over a longer period of time (in extreme cases even over several years).

In other cases, it can be justified to consider projections. As an example, certain standards may not be widely used yet, but, under the assumption that they would, projections could be made for the benefits that would result if the standards would be applied (**situation 1** being the current situation and **situation 2** the conditions assumed in the projection). An example are standards for supply parts which are used by a single company: Assuming that these standards were used throughout the industry with consequent lower prices for these types of supplies would give an impression what the impacts of these standards could be, in case of a wide use of the standards.

1.6.2 Comparing concurrent conditions – Projects

Another type of comparison is the following: standards may be used in certain projects, e.g. due to customer requirements or for sales in certain markets, whereas they may not be used for other similar projects. In such a case there exists a **concurrent relationship** between **situation 1** and **2**.

Irrespective of whether the before-after or the concurrent relationship is applied in a case study, the assessment attempts to identify the difference between the two situations and, through applying the same indicators in the comparison, to determine and quantify the

contribution of the standards. The same approach is applied if an organization has migrated from using one set of standards (**situation 1)** to using another set of standards (**situation 2)**.

1.6.3 What-if comparison

Another approach is the comparison resulting from a "**What-if**"-assumption, which is based on estimating how certain activities/processes would be performed *without standards* (**situation 1)** and comparing such a condition with the existing situation, in which standards are applied (**situation 2)**. Such a comparison can be made by applying the insights of company experts or by substituting the missing data for the company being analyzed with data for the same or comparable functions from similar companies from the same industry with a similar size etc.

1.7 Collecting the data and limitations in their availability

The data needed for the assessment is obtained through desk research and the use of available statistical and other industry data (see **step 1** in **section 1.5**) as well as through interviews and workshops with company representatives (mainly in **steps 2** and **3**). Preference should be given to interviewing heads of business functions or managers at similar operational levels, trying to combine as best as possible technical knowledge regarding the company operations (and the way standards are used to support them) with understanding of the company business fundamentals.

If possible, and if data is available, information obtained through interviews with company experts should be compared and related to information about the whole industry and similar companies.

The collected information is finally aggregated to calculate the overall value created by the use of standards in the particular company (in **step 4)**.

Some of the data needed to assess the impacts of standards, such as nonconformity rates of product, time needed to operate certain processes, volume of production, manpower costs etc., may be readily available. Other data may be lacking.

If there is not sufficient data available or the data is not considered to be reliable enough for a calculation, data obtained from assessments of the same or similar functions in other comparable companies or data estimated by company experts can be used to fill in the gaps.

1.8 ISO Methodology toolbox

The ISO Methodology contains a toolbox that can be used to support the assessment process, as well as the recording of information and the calculation of the impacts of standards. These tools have a support function, but are not a condition for a successful application of the methodology.

An overview of the individual tools is given at Annex C.

2

Insights from case studies

This part provides examples from case studies to clarify key aspects of the ISO Methodology[1]. In some cases, reference is made to the full text of individual case studies.

2.1 Value chains

2.1.1 Identification of an industry value chain for a company assessment

If the impacts of standards are assessed for a particular company, the identification of the industry value chain serves mainly to understand the interfaces of the company with its main suppliers and customers. Such an insight can contribute to a better understanding of the operations of the company and its dependence on its upstream and downstream markets. Information about the industry value chain can be collected through desk research and interviews with industry experts.

In case it is difficult to obtain such information, the following practical approach is suggested. As shown in **figure 15**, place the chosen company in the center of a value chain. Then determine the key suppliers that provide inputs directly to the company (in the form of raw materials, parts, equipment, fuels, consultancies etc.). These suppliers are referred to as "direct" suppliers of the company.

Then determine the main suppliers of the direct suppliers, who are referred to as "indirect" suppliers as seen from the perspective of the company. Do the same for the customers and identify first the main direct customers to whom the company delivers its goods or finished parts. Then determine the main customers which are served by the outputs produced by the direct customers of the company (the "indirect" customers).

1) The collection of case studies available in February 2013 consists of 21 company case studies.

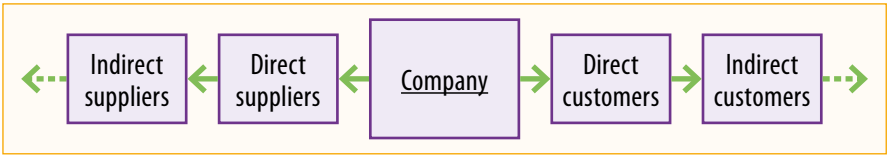


Figure 15 – Approach to the development of an industry value chain

Typically, such a description is sufficient for the purpose of understanding the main external interfaces of the company and locating it in the industry value chain.

Depending on the industry and on the specific characteristics of the company, other factors can also be of key importance, such as the structure and characteristics of the competition and the regulatory environment.

Examples of industry value chains from case studies

Figure 16 gives an overview of the industry value chain of the automation industry which was developed in the project with Festo, Brasil (Brazil). In the model industry value chain the operations of the company are placed in the middle between suppliers and customers. It should be noted that the necessary level of detail of value chains depends always on the needs of each specific assessment.

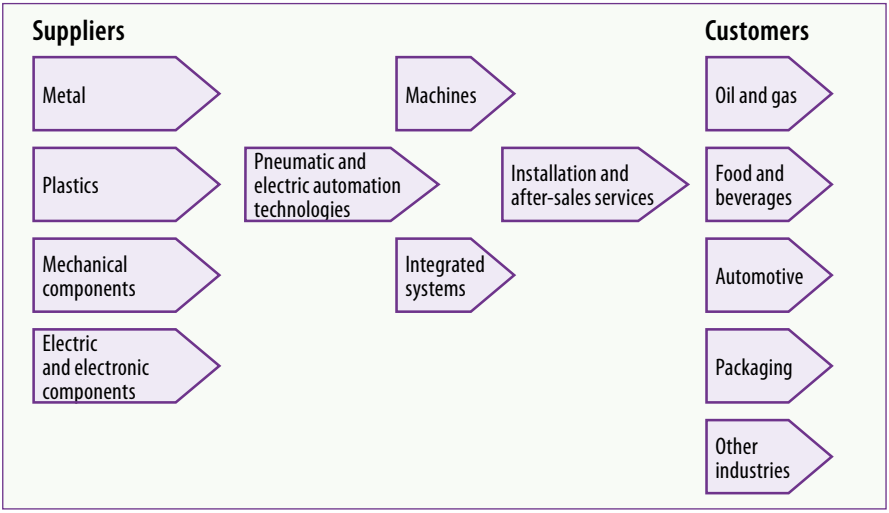


Figure 16 – Automation industry value chain (Festo, Brazil)

Figure 17 provides an overview of the industry value chain of the chocolate manufacturing industry developed in the project with Chococam, Cameroon. In a similar form, the operations of the company are shown in the center of the industry value chain between suppliers and customers.

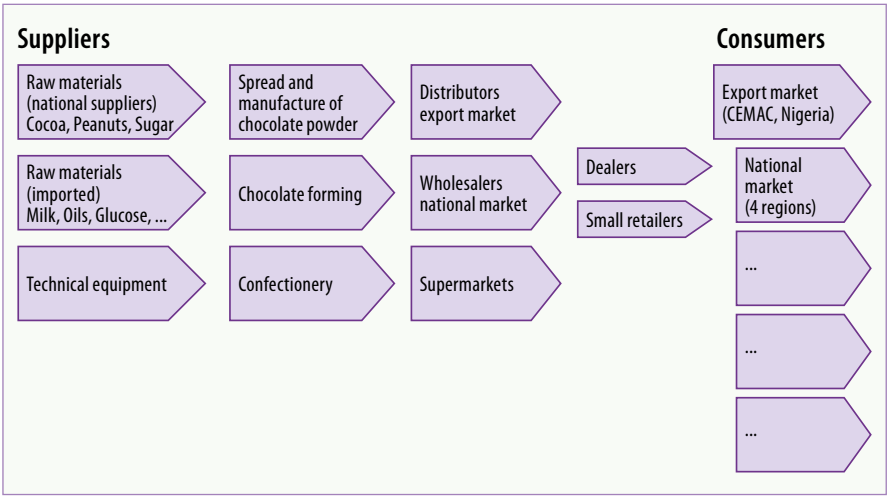


Figure 17 – Chocolate manufacturing industry value chain (Chococam, Cameroon)

The example in **figure 18** is from a case study of the Dalian Shipbuilding Industry Corporation, China, which applies a segmentation of the industry in up-, mid- and downstream activities.

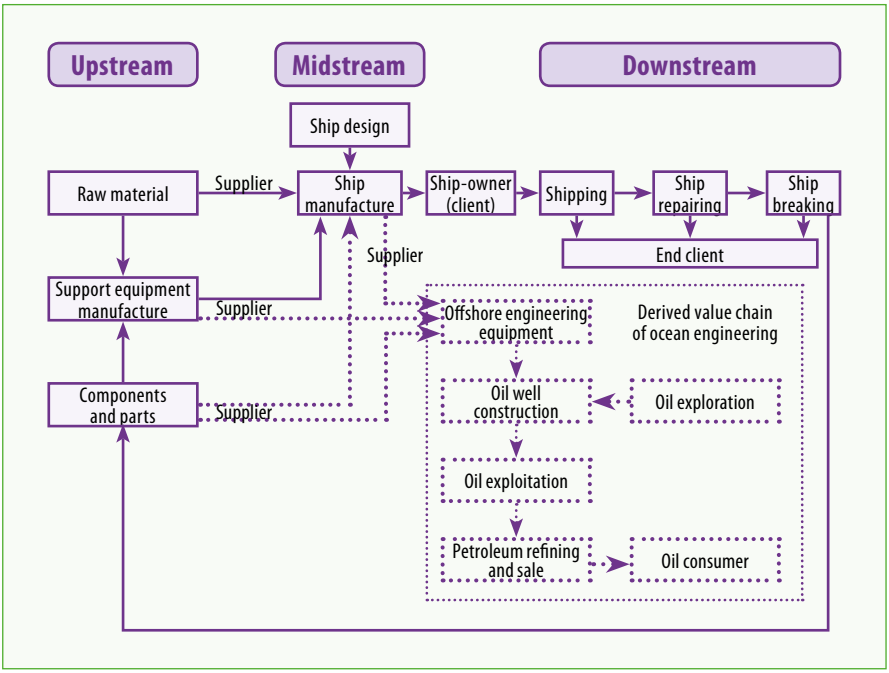


Figure 18 – Shipbuilding industry value chain
(Dalian Shipbuilding Industry Corporation, China)

Finally, the industry value chain of NTUC FairPrice, Singapore, (in **figure 19**) provides a different example of an industry value chain composed mainly of logistical processes. It covers the aspects of supplier relations, procurement and delivery to retailers, for which a warehousing function is applied, as well as the return or recycling of unsold (or rejected) goods.

Supermarket life cycle	Market Planning	Procurement	Warehouse / Retail	Return recycling
Key players				
Manufacturers				
Suppliers				
Logistic service				
Technology service				
Human resource				
Financial service				

Figure 19 – Supermarket industry value chain (NTUC FairPrice, Singapore)

2.1.2 Company value chain

It is recommended to start a company analysis by collecting information about the company from various sources, such as annual reports, company publications, catalogues and others, as well as interviews with company staff. A quality manual of the company (with related documentation) is particularly useful, because it often provides a well-thought out, structured view of the company business processes and organizational structure.

It is then recommended to try to map this information to the company value chain model developed by Michael Porter (see **figure 2** in **1.4.1**). In some instances, there may be a good fit between the model and the company operations, in particular if the company is a manufacturing company. In other cases, it may be necessary to adapt this model to the core processes of the chosen company (see e.g. the value chain of NTUC FairPrice).

It is important that the value chain model is adapted in the analysis to the realities of a specific company so that the model reflects the core process stages of the company (as the primary activities) as well as the main functions that support the core process (as the supporting functions).

Examples of company value chains from case studies

Figure 20 is from a case study of the company Xinxing Ductile Iron Pipes (China) and shows the main activities in the business functions of its value chain (which matches the original model developed by Porter).

Management & administration				
Research & development				
Engineering				
Procurement : including procurement of raw materials, fuels, and charges				
Inbound logistics	Production/ operation : iron making, steel	Outbound logistics	Marketing & sales	After-sales service
Train and truck transport	Making steel, steel rolling, and pipe casting	Train and automobile transport	Sales of cast and steel pipe and steel grating plate products	

Figure 20 – Company value chain (Xinxing Ductile Iron Pipes, China)

Figure 21 is from a case study of Gerfor, a PVC pipe company in Colombia, showing the grouping of key activities into business functions.

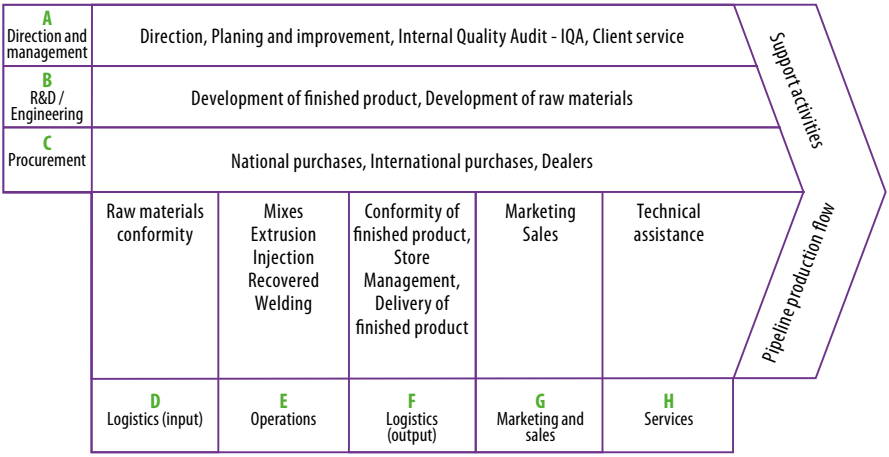


Figure 21 – PVC pipe manufacturing company value chain (Gerfor, Colombia)

The next example in **figure 22** is from a case study of a food company in Egypt, Juhayna Food Industries, and their fruit juice manufacturing operations.

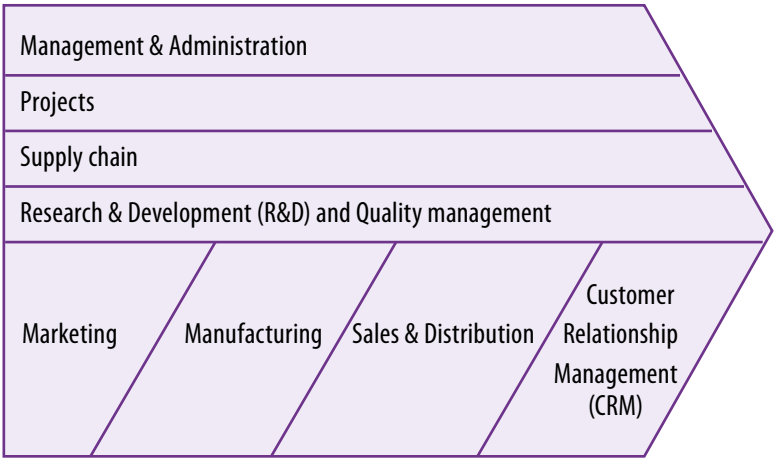


Figure 22 – Company value chain (Juhayna Food Industries, Egypt)

2.2 Identify the impacts of standards

In some cases, tables of the key activities performed by the various business functions have been developed with an associated listing of the standards used in these activities. Some examples are shown in **tables 6** and **7** below.

Holcim Lebanon

Business function	Activities	External standards (currently used)	Year when standards were first introduced (possibly an earlier edition than that currently used)
Management and administration		ISO 9001:2008 ISO14001:2004	2003 2004
Procurement		ISO 9001:2008 ISO14001:2004	2008 2004
Production	Quarry and preparation of raw material	EN 197-1:2004 NL 53:1999 ISO 9001:2008 ISO 14001:2004	2004 1999 2003 2004
	Clinker production	NL 53:1999 ISO 9001:2008 ISO 14001:2004 ASTM D 388:1999 ASTM C 465:1999	1999 2003 2004 2011 2011
	Grinding	ISO 14001:2004 ISO 9001:2008	2004 2003

Table 6 – Activities and standards used (Holcim Lebanon, Lebanon)

Business function	Activities	Standards	Description
Manufacturing	Raw material reception	ISO 22000:2005 ISO 17025:2005	• Food safety management systems • General requirements for the competence of testing and calibration laboratories
	Materials preparation : sugar syrup and other production ingredients	GMP standards ISO 22000:2005	• General requirements for the competence of testing and calibration laboratories • Good manufacturing practice • Food safety management systems
	Mixing process	GMP standards ISO 22000:2005	• General requirements for the competence of testing and calibration laboratories • Good manufacturing practice • Food safety management systems
	UHT treatment (pasteurization)	GMP standards ISO 22000:2005	• General requirements for the competence of testing and calibration laboratories • Good manufacturing practice • Food safety management systems
	Filling and packing	GMP standards ISO 22000:2005	• Good manufacturing practice • Food safety management systems
	Palletizing	GMP standards ISO 22000:2005	• Good manufacturing practice • Food safety management systems
	Storing until dispatch to distribution centre	ISO 22000:2005	• Food safety management systems

Table 7 – Activities in the production function and standards used (Juhayna, Egypt)

In other cases, a more detailed analysis has been conducted, resulting in process maps showing the main activities undertaken by the company inside a business function. In some cases important standards used have been mapped to the stages where the standards are used. Examples of process maps are given in **figures 23**, **24** and **25**.

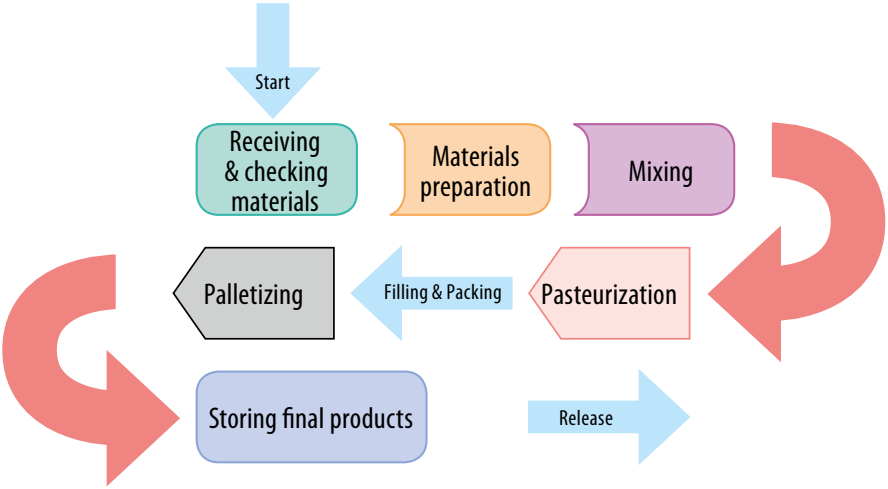


Figure 23 – Production process map (Juhayna, Egypt)

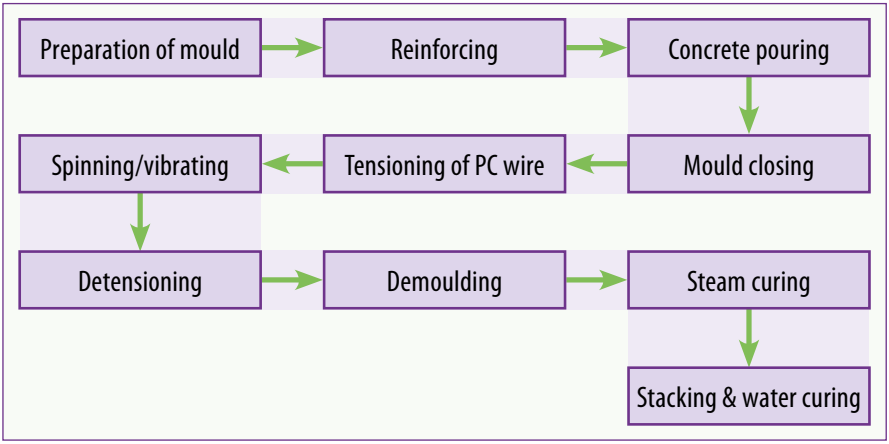


Figure 24 – Production of concrete piles process map
(PT. Wijaya Karya, Beton, Indonesia)

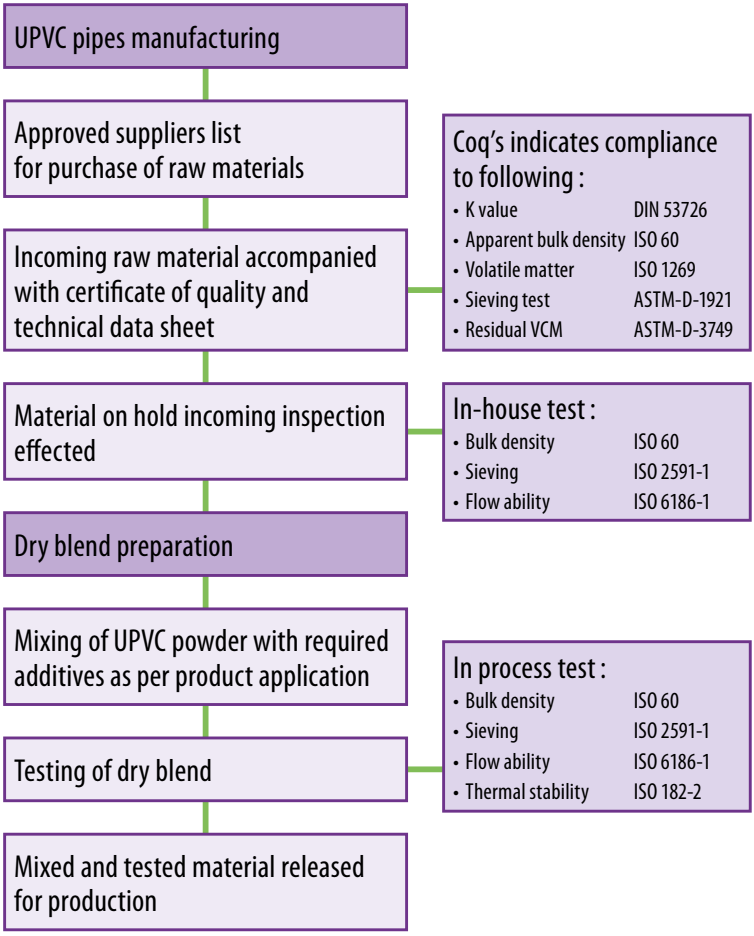


Figure 25 – Pipe manufacturing and standards used (PPP PSL, Mauritius)

2.3 Scoping the assessment

It is important to scope the assessment in a realistic way in order to achieve results in the given time frame and within the limits of available resources. It is particularly important to minimize the use of the time spent by company experts, involving them in key, well-prepared steps (more details about timing and resources are given in **section 4.**)

Depending on the company's size and on the project's objectives, the scope of an assessment can be :

Limited to one or a few business functions, covering :

- An individual site of a company
- One or more business units or product lines (which may comprise several companies belonging to the same holding firm)
- The whole company (this is normally feasible only for small or medium-sized companies).

The scope of the assessment can also be restricted to a given set of standards, or even to just one standard, applied in one or more business functions. However, the basic approach of the ISO Methodology privileges the assessment of the overall standards' contribution to a relevant part of a company business (or the whole business). Nearly all the case studies developed by NSBs and ISO so far have considered a multiple set of standards used by at least one business function.

In the vast majority of the case studies undertaken (14 out of 21), three to five business functions have been investigated. One or two business functions have been considered in five cases and six or more in the remaining two (see **figure 26**).

The focus of a study and the selection of business functions should always be determined by considering which business functions play a major role in a company and where standards have a visible role for the operations or the business success of a company.

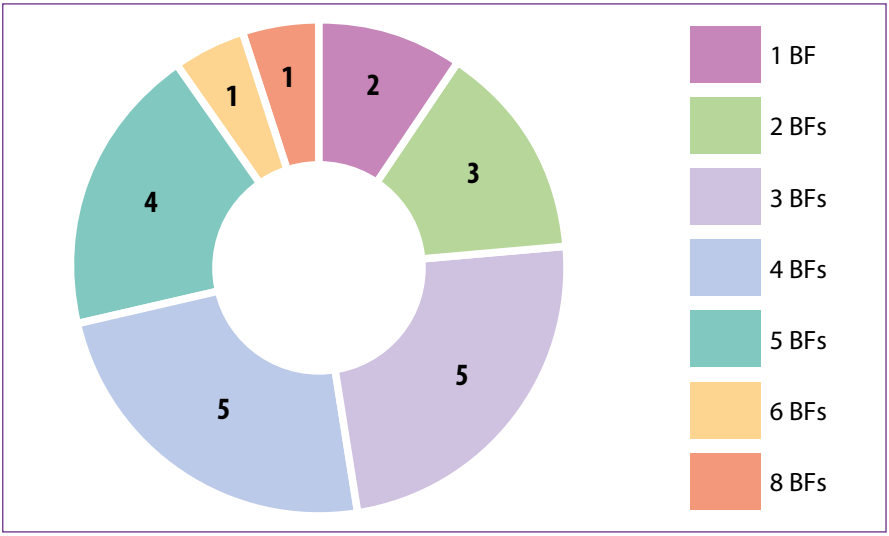


Figure 26 – Case studies and number of business functions (BFs) assessed in each of them

2.4 Determine value drivers

Value drivers are key capabilities of a company through which it creates competitive advantages and builds the basis for its business success. In some cases, a value driver can be associated with activities of a particular business function. In other cases it may extend to activities performed by several business functions or even certain operations of the whole company.

Examples of value drivers from the case studies

Below a list of value drivers identified in a number of case studies is shown :

VINAKIP, Vietnam – Electrical appliances

- Safety and quality of products
- Continual improvement

- Competitive pricing
- Customer focus

NTUC FairPrice, Singapore – Supermarket, food logistics

- Partnership with suppliers
- Quality of products and processes
- Safety compliance
- Efficiency of processes
- Sales effectiveness and customer retention

Gerfor, Colombia – Plastic pipes / Construction materials

- Distribution channels
- Customer service
- Product quality
- Production capacity
- Process efficiency

Xinxing Ductile Iron Pipes, China – Construction materials

- Innovation and new product development
- Efficient and lean procurement function
- Efficient production of higher-value added products
- Aggressive marketing and new market development

Water Senegal, Senegal – Water services

- Ability to deliver water in the required quality and quantity
- Network maintenance
- Efficient billing system, recovery and customer relationship system
- Capability to expand the water delivery network

Mapei, Italy – Ceramic tiles / Construction materials

- Product innovation
- Product quality and reliability
- Customer service

- Health, safety and environmental protection

Please note that the toolbox of the ISO Methodology contains a value driver map (see **tool TB_08**) with a listing of some key value drivers which can be used as a check-list to identify value drivers in a particular project.

2.5 Identify operational indicators and principles of calculation

Operational indicators are used to measure the impacts of standards on the activities performed by the selected business functions and to quantify their contribution to the company's value creation (expressed as contribution to the company EBIT).

The selection of the right operational indicators is one of the most critical tasks of the assessment process.

To be effective, operational indicators need to be highly representative of the activities of the business functions under investigation, in order to determine performance in a reliable manner. Additionally, there needs to be a relationship between the operational indicators and the use of standards, in order to determine the standards' impacts.

Good insight from the company experts is essential – although it may not be easy or immediate to obtain. In-depth discussions may be needed, along with re-consideration of issues and the comparison of different opinions.

Operational indicators are usually selected in the following two steps :

1. Firstly, performance indicators already associated with the activities under investigation are considered, along with other possible ones that could be relevant to the scope of the analysis. Companies that have implemented successfully the ISO 9001 quality management standard tend to have in place a structured set of

key performance indicators for the various business processes and business functions. Indicators that are regularly monitored represent a useful basis.

2. The preliminary list of indicators needs to be critically reviewed, to determine which ones are impacted by the use of standards and if information is available (either through company data or experts' estimates) to quantify the impact of the standards.

In a final step a set of operational indicators is selected from the list of indicators for the quantification.

Even if the assessment will be performed with only a few operational indicators, the results of such an analysis will be beneficial in terms of process insight, giving the opportunity to refine and improve the evaluation of the role and impact of standards in the future.

Examples of operational indicators for different business functions

Tables 8, 9, 10, 11, 12 and **13** give for the various business functions operational indicators from the case studies that have so far been concluded. In some instances, there may be an overlap between different indicators.

Business function : Research and development (R&D) / Engineering

Activities	Operational indicators	Definition
Product development research	Savings in time due to the application of standards in research resulting in increased reliability	Average failure rate of products (before & after the introduction of standards)

Activities	Operational indicators	Definition
Dissemination of research results and transfer of information (through the quality management system)	Time for dissemination	Saving of time through the dissemination of information due to the provision of standards indicators (e.g. for material specifications, process specification and standardization of aspects of the product, which are transformed into work instructions, operational procedures, brochures etc.)
Developing product specifications	Savings due to not having to write specifications internally	Using existing standards for materials, products, processes etc., the company has savings (money, time, human resources) otherwise needed to write internal specifications
i. New products marketed ii. Production process improvement iii. Product development	1) Number of new products accepted by customers over the number of products of the company 2) Number of complaints related to new products 3) Number of projects initiated per month 4) % of projects completed on time 5) Number of new processes deployed divided by the number of new processes developed	The first two indicators seek to assess the effectiveness of new product development ; indicators 3 and 4 concern the efficiency of R&D work ; the fifth indicator assesses the effectiveness of R&D's process improvement activities
Product development	Clearer product specifications : Standardized specifications of the suppliers' products make it easier to collect relevant information	Personnel costs : costs per year for developers
Research/Product development	Better internal information transfer : Using standardized documents and specifications improves dissemination of product and service information within R&D	Personnel costs : costs per year for developers

Activities	Operational indicators	Definition
Equipment set-up for manufacturing of different products	Time needed to prepare facilities, equipment for the production of other products	Time needed before and after the use of standards

Table 8 – Examples of operational indicators for Research and Development / Engineering

Business function : Procurement

Activities	Operational indicators	Definitions
Supplier selection	Order availability on time	Avoidance of misunderstandings about required specifications for supplied raw materials and other goods
Information exchange with suppliers	Time spent on communication with supplier	Time spent on communicating product requirements, regulatory requirements, standard compliance, package size, quality, etc. while placing orders and general matters
Contracting	Contracting activities with suppliers	Long term contracts are concluded with selected suppliers on the basis of their quality and standards in factory reducing the number of suppliers
Complaints handling	Number of customer return cases	Customer return cases from retail store due to spoilt product after purchase
Screening of suppliers ; selection of suppliers ; negotiating and contracting ; monitoring	Reduction in costs for supplier management	By applying standards for materials, the company can cooperate with more reliable suppliers and can reduce the cost for supplier management in terms of time and human resources
Supplier communication	Work savings	Hourly cost of concerned personnel (HH/year) / Time reduction for processing orders (%) / Time-to-market (days)

Table 9 – Examples of operational indicators for Procurement

Business function : Inbound logistics

Activities	Operational indicators	Definitions
Testing of incoming raw materials	Through the communication of requirements for supplies and the reference to standards, the resources needed for testing of raw materials has been reduced and fewer tests are performed	a) Time, number of people and other resources needed for the testing of supplied goods b) Percentage of nonconforming material supplied
Internal checks	Number of nonconformities	Cases of supplied product not meeting quality or other requirements of standards

Table 10 – Examples of operational indicators for Inbound logistics

Business function : Production / operations

Activities	Operational indicators	Definitions
Waste handling	Amount of production of waste (products that have to be disposed of and cannot be re-used or repaired)	Rate of waste generated before and after the use of standards
Product testing	Reduction in costs for testing final products	Development of the costs for final product testing before and after the use of standards
Continuous improvement	Saving of costs in production by continual improvements	By implementing a quality management system according to ISO 9001 and applying continual improvement processes to promote initiatives, the company can save a significant amount of costs in production in terms of time, human resources, materials and can achieve product improvements
Materials handling	Savings of materials in production	Measurement of the development of savings due to improved handling of materials before and after the introduction of standards
Quality of production	Reduction of cost in handling rejections, reworking and repairing of defects	Reduction of cost compared to the previous cost in handling rejections, reworking and repairing of defects

Activities	Operational indicators	Definitions
Project management	Time taken from mobilization to handing over of a particular project (project cycle time)	Time compared to the previous project cycle time
Minimizing defective work at hand over	Reduction of rework/repair during project completion	Reduction of cost arising due to less additional material and time
Reliability and stability of the production process	Through the use of standards to monitor systematically the production process, the control over the process has increased	Conformity rate of the goods produced
Continuous production	The breakdown hours/production stops	Reduction in the breakdown hours
Production output	Increase in production volume	Increase in production volume before and after the use of certain standards
Energy consumption per unit of product	Energy consumption (fuels, electricity etc.) in relation to the total production output	Costs for energy per unit volume of production
Reduction of waste	Reduction of waste	Cost savings due to the reduced generation of waste
Saving in use of raw materials	Through a new design of wall pipes (with a three-layered structure) raw materials could be saved while retaining the performance characteristics of the product	Reduction of use of raw materials and savings thereby ; improvement of environmental record by using less materials (and also reducing waste and emissions)

Table 11 – Examples of operational indicators for Production/operations

Business function : Marketing and sales

Activities	Operational indicators	Definitions
Marketing and sales	Increase of sales	Due to new or modified products or due to improvements in production, the company can increase sales revenues and profits
	Access to existing markets that are new to the company	By meeting certain requirements (regulatory or market expectations), the company can access markets that were previously closed to it
	Creation of new markets	By developing a new type of product, the company creates a new market and has for a certain period of time a monopoly position in this market
Bill generation	Reduction in time taken to calculate and prepare the interim bills on monthly basis for the construction	Time consumed to prepare the monthly bills

Table 12 – Examples of operational indicators for Marketing and sales

Business function : After-sales service

Activities	Operational indicators	Definitions
Customer service/ complaints handling	Response to enquiries by customers	Due to clearly defined processes customer enquiries about the functionality of products as well as complaints can be handled quickly and satisfactorily
Warranty compensation	Replacement costs for non-functional products (warranty)	Measurement of the development of costs for compensation payments due to warranty claims

Table 13 – Examples of operational indicators for After-sales service

2.6 Calculate the impacts of standards

To calculate the impacts of standards, a number of aspects need to be considered.

2.6.1 Time frames for the assessment of impacts

It is assumed that during a certain period after the introduction of the standards, impacts can be measured, through the variation of the values of the selected operational indicators.

Over time, the impacts diminish or are no longer visible as the standards become part of the day-to-day operations of the company. It is therefore suggested that assessments do not extend beyond a period of five years[2] after the introduction of the standards.

2.6.2 Approaches to calculation

The approaches to quantify the impact of standards on the selected indicators have been described in **section 1.6** (" before-after ", " comparing concurrent conditions – projects ", " what-if "). Experience has shown that the " **before-after** " comparison is usually the most effective. It is therefore recommended, as the first choice, to make the best effort to apply it, even if the input from company experts may at first indicate that data are not available. It is worth trying to dig into the matter in some detail, asking different questions to stimulate the understanding and ideas from the experts (e.g. by refining the selected indicators, or trying to identify new ones, always focusing on variables that can be quantified).

Please note that the assessment of standards impacts is a non-conventional type of analysis which is rarely part of established company

2) There may be a few exceptions, justified by the context – e.g. see the case studies of NTUC FairPrice or Mapei.

practices. For most people and organizations, this is something new and it requires looking at things from a different perspective.

2.6.2.1 Separation of impacts from standards from other factors

The way to calculate the contribution of standards to the company EBIT varies in relation to the specific situations.

In what follows, we provide an outline of the most frequently used types of indicators, of how the standards impact is expressed in terms of variation of the indicators' value and of how that variation is translated in financial contribution to the company EBIT.

Please recall that to perform these calculations correctly, it is important to isolate the specific impact deriving from the use of standards from other factors, e.g. organizational changes and new technologies, to determine the variation of the value of operational indicators.

For example, a productivity increase is achieved for certain activities after the introduction of standards. This improvement is determined by changes in the work practices that have been driven by the new standards – but also by organizational changes and the use of newly introduced technology. In such a case, company experts need to evaluate as objectively as possible what is the relative contribution of the different factors that influence the result.

An approach that has proven to be effective consists of putting the same questions separately to different company experts with good knowledge of the context. Possible diverging estimates can then be reconciled through in-depth discussions, which usually result in an improved understanding of the context and in more reliable, shared assumptions.

In practical terms, a percentage of the total operational indicator variation is finally attributed to the impact of standards.

2.6.2.2 Indicators expressing a direct versus an indirect financial contribution

"**Direct financial contribution**" means that the indicator already expresses a financial impact, either as an absolute figure or as a percentage.

For example, the variation of the "cost of procurement" for a given category of goods or services indicates "cost savings" (or "cost increases"): an item which represents in itself a contribution to the company EBIT. As an example, annual cost savings of USD 500 000 (an absolute figure), mean a contribution of USD 500 000 to the company gross profit. If the variation is expressed in percentage, see **section 2.6.2.3**.

In case of increased sales, one needs to keep in mind that increased sales deriving from facilitated access to certain markets represent a "direct" financial impact. However, the actual contribution to the company EBIT is determined by the amount of increased sales less, as a minimum, the direct costs[3] associated with them. For example, an annual increase in export sales of USD 2 million would generate a contribution to the company gross profit of USD 2 million less the cost for the manufacturing of these goods, sales and transport. Assuming a 50 % cost of goods, the resulting EBIT contribution would be USD 2 million – 1 million = USD 1 million.

"**Indirect financial contribution**" means that an indicator expressed as a non-financial impact needs to be converted into a financial impact. Consider for example the indicator "professional time" needed to design a product. In this case, if we determine that, due to the use of certain standards, the team of engineers in charge of product

3) Only "direct costs" are deducted under the assumption that only additional marginal costs are required to achieve these extra sales. If that is not the case, a full cost deduction could be more appropriate, including direct costs plus overheads.

development (e.g. five people) saves 60 hours per month, in order to determine the cost savings we need to know the average cost for company engineers. Assuming an average cost of USD 100 per hour, the annual cost savings for the company would be USD 60 × 100 × 12 = 72 000 and this would be the contribution of standards to the company EBIT.

2.6.2.3 Absolute figures versus percentages

If the variations of the indicators' values are expressed in absolute figures, they can be converted into contributions to the company EBIT either directly, if they are "direct financial contributions", or by converting them into financial figures using appropriate company data, as in the previous example regarding professional time.

Most often, however, quantifications are given in percentages. The examples below describe the steps to convert such valuations into absolute financial figures.

Example 1 :

The total cost for the design of machine parts in a company after standards have been introduced are USD 1 000 000. It is estimated by company personnel that the use of standards has reduced the total costs by 10 %. This means that the current total design costs of USD 1 million already take account of the impacts of standards.

Calculation :

Total actual costs (after standards were introduced – in USD) :	1 000 000
Cost reduction due to standards	10 %
Total costs (without or before the use of standards)	**1 111 111**
Estimated cost reduction due to standards	**111 111**

Explanation :

If the total actual cost, which includes the reduction due to standards, is 1 million USD and the use of standards has contributed to the reduction by 10 %, the costs without or before the use of standards is calculated as follows :

Total cost = Total actual cost /(1-10 %) : 1 million / 0,9 = 1 111 111

The cost reduction of costs due to standards is therefore 10 % of USD 1 111 111 = 111 111.

For simplicity, it is often useful to make an approximation and apply the standards impact assuming as a baseline the current actual costs. In example 1, this would mean 100 000 versus 111 111.

Example 2 :

In the costs of project development, it is estimated that professional time saved through the use of standards is 20 %. Labour represents 80 % of the project development costs. The impact of standards on project development costs can be determined as 20 % of 80 %, i.e.16 % of project development costs.

The calculation is then made as in the previous case.

Calculation :

Total actual costs for project development (after standards were introduced – in USD) :	10 000 000
Cost reduction due to standards (in USD)	16 %
Total costs (without or before the use of standards)	**11 904 761**
Estimated cost reduction due to standards	**1 904 761**

Example 3 :

The failure rate in manufacturing/production was reduced by 30 % due to standards. Since 10 % of the overall engineering costs are related to production failures, the impact from standards can be estimated to be around 3 %.

The current total cost for manufacturing/production is USD 1 million and it already includes the contribution from the use of standards. As shown below, the cost base has therefore to be adjusted to reflect this impact :

USD 143 000 = 100 000/(1 – 0.3).

From this basis, the impact of standards is then calculated as (= 0.3 x 143 000).

Better quality of equipment and supplies – Standards help implement quality management more effectively	
Has this impact had a significant effect on your function due to standards introduced or modified in the past five years ?	Yes
Overall engineering costs (USD m)	1
Percentage of overall engineering costs related to failures	10 %
Reduction of the failure rate due to new quality management standards	30 %
Total financial impact on adjusted cost base (USD)	42 900

Example 4 : NTUC FairPrice, Singapore

This study focused on three business functions, which are procurement (comprising sourcing and supplier management), warehousing/distribution (in two main central warehousing and distribution centers of NTUC) and retail (comprising the provision of goods to the retail outlets, including final quality check, processing of returns etc.). Based on an identification of key standards applied by NTUC FairPrice, the following areas and impacts of standards were selected for the assessment :

- Cold chains to support refrigeration and therefore delivery over larger distances of perishable products and related standards
- Bar codes that are used in package identification, warehouse management and distribution
- Pallet standards used in package storage and delivery

The impacts of the use of the standards were estimated by NTUC managers on the basis of a total set of 21 operational indicators, such as :

- Time to undertake a process
- Quantity of packages being processed
- Productivity of staff
- Volume of sales
- Operational cost
- others

The calculations of cost savings were undertaken on the basis of cost averages for staff and operations and related to the increased sales revenues. It turned out that the standards had significant impacts in terms of efficiency gains and increase in output (see details of the calculation in **table 14**).

Finally, it was assumed that the standards had an average impact of five years, so the average annual contribution in an area of operations of NTUC was spread over five years, which then resulted in a valuation of the total impacts of the identified standards.

However, it needs to be noted that, because the standards were introduced at different times, their impacts and EBIT contributions became also visible at different times.

Average annual impacts of standards across different business functions at NTUC FairPrice (in Singapore Dollars – SGD)

Period : 1999 – 2009

Standards (by subject area)	Procurement	Distribution Centre		Retail	Total In SGD
		GLS	FFDC		
Cold Chain Milk and Dairy	7,613	-	31,613	102,451	**141,677**
Cold Chain Chilled Pork	18,935	-	-	622,704	**641,639**
Standard Pallet	-	713,600	-	-	**713,600**
Carton Barcode	-	3,064,551	-	-	**3,064,551**
TOTAL	**26,548**	**3,778,151**	**31,613**	**725,156**	**4,516,467**

Table 14 – Example for a calculation of the impacts of standards – NTUC FairPrice, Singapore

Example 5 : Festo Brasil, Brazil

In the case study of Festo, Brasil, the key impacts of standards were identified in the business functions procurement, engineering and production/operations.

The EBIT impacts of standards were calculated as follows :

Procurement

Procurement costs for metals make up 30 % of the total procurement cost. Procurement costs for plastics and other items : 20 % of the total cost. The impact of standards on the procurement function has been identified as (i) work savings, and (ii) purchase savings. As far as work savings are concerned, the amount of work needed to complete Festo Brasil's purchasing process for non-standards based metals is estimated to be five times higher than for standards-based metals.

Orders for standards-based metals represent about 7.5 % of total orders. Personnel cost for the purchasing department is 40 % of BRL 13 million, that is, BRL 5.22 million.

Savings due to the use of standards in processing orders can therefore be estimated as 80 % of 7.5 % of BRL 5.22 million, or about BRL 312 912 per year.

In purchase savings – the second standards impact – standards-based goods cost on average 30 % less than non-standard-based ones. Orders for standards-based metals represent about 7.5 % of total orders. Savings due to the use of standards-based metals can therefore be estimated as 30 % of 7.5 % of BRL 143 million, or about BRL 3 219 750 per year, or 2.25 % of procurement costs.

Engineering

Two types of impacts have been identified in the engineering function : (i) work savings (design time) and (ii) savings due to reduction in project time.

Savings in design time due to implementing certain key standards used in product design impacted about 33 % of engineering manpower. In addition :

- Estimated design time savings were about 10 %
- Personnel cost for the engineering department is 50 % of BRL 7.16 million, i.e. BRL 3.58 million per year
- Savings from using the respective standards can therefore be estimated as 10 % of 33 % of BRL 3.58 million or BRL 118 058 per year, or 1.6 % of the cost of the engineering function.

For savings from reduction in project time :

The total amount of engineering hours per month required from product design to production set-up was estimated at 2 670 hours

Estimated total time reduction was 5 %

Hourly cost of personnel was BRL 127

Total cost of personnel was BRL 338 670 per month, or BRL 4.07 million per year

Savings from using standards for geometrical and positional tolerances can therefore be estimated as 5 % of 4.07 million which amounts to around BRL 203 202 per year.

Production/operations

The major impact of standards on the production/operations function has been in production efficiency gains. Here, the mix of measures introduced through the standards-driven continual improvement process has enabled the company to achieve BRL 1.59 million savings in production costs (about 13 % of total 2010 production). The implementation of standards was estimated to have contributed about one third of this improvement, or about BRL 524 700.

The total EBIT contribution of standards to the operations of Festo, Brasil, is given in **table 15**:

Business function	Operational indicators	Financial impact (in Brazilian Real – BRL)
Procurement	Work savings	312 912
	Purchase savings	3 219 750
Engineering	Work savings (design time)	118 058
	Savings due to reduction in project time	203 202
Production/operations	Gain in production efficiency	524 700
Total EBIT impact of standards		**4 378 622**

Table 15 – Calculation of the total EBIT impact of standards in Festo, Brasil (Brazil)

Example 6 : Plastic Pipes and Products Piping Systems Ltd. , Mauritius

Business function	Operational indicator	Quantitative benefits (in million MUR)	Quantitative benefits (% sales revenue)
Inbound logistics	Time, manpower needed for testing incoming raw materials **(reduced by 50 %)**	0.009	0.007
Production	Reduction in downtime **(from 5 % to 3 %)**	2.42	2.0
	Reduction of waste in production processes **(by 1.6 %)**	1.91	1.58
	Energy consumption per unit of product **(reduced from 0.8 KWh/Kg to 0.6 KWh/Kg)**	1.09	0.9
a) Contribution from " regular " products:		**5.43**	**4.5 (%)**
b) Contribution from structured wall pipes: Production – Saving in the use of raw materials (by 25 %)		**5.7**	**4.7 (%)**
Total contribution (a + b) :		**11.13**	**9.2 (%)**

Table 16 – Example for a calculation of the impacts of standards – PPP PSL, Mauritius

Table 16 shows the summary calculation for the average annual impact of standards in a project conducted with Plastic Pipes and Products Piping Systems Ltd., a company in Mauritius. As shown, four operational indicators have been applied for the two business functions inbound logistics and production. The study addressed two types of products, which are referred to as " regular " products as well as a single special product, structured wall pipes, for which PPP PSL has currently a monopoly position in the Mauritian market. The design of the latter product is based on a particular European standard. This design is material-saving and has resulted in a significant boost of the revenues of the company, which can be directly attributed to the use of this standard.

2.7 Dealing with limitations in the availability of data

2.7.1 Estimations based on experience

In some instances, data are not sufficient to allow a comparison. In this case, missing data needs to be replaced by estimations by company staff with the necessary experience.

2.7.2 Extrapolations

In some instances, no data are available for a certain indicator for a particular company. In this case, data (or the percentage impact) can be considered that has been calculated for another company of the same or a similar industry for the operational indicator. However, care needs to be taken when considering such an approach.

2.7.3 Aggregation

Finally, the calculated data for the impact of standards for the selected business functions are aggregated and calculated as a percentage of the EBIT of the company. This leads to the final result of the impact of standards on the chosen business function(s) or the company as a whole (depending on the scope applied in the assessment).

3

Summary of findings

3.1 Findings from company case studies

3.1.1 Overview

ISO has worked with over 20 of its members, national standards bodies in different countries, to develop case studies to assess and quantify the benefits companies can obtain from the use of standards. These projects were undertaken in close cooperation by the ISO member body, a company in its country, staff of the ISO Central Secretariat acting as advisors to the project team and, in many cases, an academic institution. The studies were conducted between October 2010 and May 2012 and are published in two volumes of the book, *Economic benefits of standards, International case studies*, the first published in August 2011 and the second in August 2012. All case studies are publicly available at : www.iso.org/benefits_of_standards.

3.1.2 Selection of companies

The selection of the companies for the projects was made by the ISO members in the various countries. The only requirements were that the company had been a user of standards at least for a number of years and that the member body had a good relationship with the company, to make sure that key staff in the company would be available for interviews and discussions with the project team. **Table 17** shows the spread over different industries of the companies assessed in the 21 case included in the two volumes of this book.

Manufacturing companies constitute the large majority of the selected companies which is not a surprise, considering the historical relevance of technical standards for manufacturing.

Industries	Countries	Volume 1 or 2
Agri-food business	Cameroon	2
	Peru	1
	Egypt	2
Chemical industry	Thailand	1
Construction & construction materials	Botswana	1
	Indonesia	1
	Italy	2
	Lebanon	2
	South Africa	1
	Sri Lanka	2
Electrical appliances	Vietnam	1
Electrical power transmission	Germany	1
Food retail/food logistics	Singapore	1
Heating, ventilation, air conditioning	Jordan	2
Industrial automation equipment	Brazil	1
Information & telecommunication	Germany	1
Pipes and piping systems	China	2
	Colombia	1
	Mauritius	2
Shipbuilding	China	2
Water supply	Senegal	2

Table 17 – Industries and countries covered by the case studies

An overview of the business functions where standards had the most impact in the companies and which therefore have been the subject of assessment is given in **table 18**. It shows that production is the business function most frequently assessed, followed by marketing and sales, procurement and R&D/Engineering.

The size of the companies varied from small companies with 25 employees and annual sales revenue of around USD 4.5 million to

companies with several thousand employees and annual revenue of over USD 2 billion.

3.1.3 Key benefits of standards resulting from the case study findings

The results demonstrate consistently that companies achieve benefits from using standards. From the company case studies it is possible to identify **three main forms of benefits from the use of standards**:

Key benefit 1: Streamlining internal operations

Standards can be used to streamline the internal processes of companies: e.g. by reducing time needed to perform specific activities within the various business functions, decreasing waste, reducing procurement costs and increasing productivity in production and engineering. Gains in efficiency also occur through the reduction of transaction costs with suppliers and customers: Most of the case studies provide evidence of this type of impact and the benefits of using standards are valued, in terms of contribution to the companies' EBIT or gross profit, between **0,15 % and 5 % of the annual sales revenues** of the companies.

Key benefit 2: Innovating and extending the scale of company operations

Some case studies provide examples that standards are used as the basis for innovating business processes, such as cold chains used in the transport of perishable goods, allowing the extension of the geographical market for food supply. In other cases, standards helped to reduce the risk to companies of introducing new types of products to national markets. Standards can also be used as a basis for the international expansion of companies by providing a common management framework.

Key benefit 3 : Creating or entering new markets

Other case studies show that standards have been used as a basis for the development of new products, for entering new markets (both domestic and export), for supporting market take-up of new products, or creating markets. (The term " new product " refers either to products that are completely new or which may have existed already, but are new to a particular national market). In special cases the impact of standards could exceed the figure mentionned before by far, reaching a contribution to the companies' gross profit of **up to 33 % of annual revenue**, helping a company to achieve a leading position in its market, at least for a certain period of time.

By applying key standards, a company may be able to shape or to access new markets. In such cases, standards can play a central role in creating confidence for potential customers in a new technology or in building trust that a company which enters a new market will be able to consistently deliver products and services with the required quality.

The case studies did not attempt to quantify the benefits derived from participating in standards development. However, the analysis indicates that when standards play an important role for entering new markets or promoting new products, companies tend to be significantly engaged in standards development and, in some cases, they have a leadership position (at national or international level). Consistent with the above, case studies also provide evidence that a focus on standards can be the core of an upgrading strategy through which companies aim at entering higher value-added segments of the value chain in their respective industries.

Business Functions (BFs) subject to case study assessment											
	Primary BFs					Support BFs				Additional BFs	
Companies/Countries	Inbound Log	Production	Outbound Log	M&S	After Sales	M&A	R&D	Engineering	Procurement	S&L	Retail
PT. Wijaya Karya (Indonesia)	×	×		×			×				
NTUC Fairprice (Singapore)									×	×	×
PTT Chemical (Thailand)		×				×					
VINAKIP (Vietnam)	×	×		×			×		×		
Festo Brasil (Brazil)		×						×	×		
Gerfor (Colombia)		×		×							
DanPer Trujillo (Peru)	×	×	×	×							
Lobatse Clay Works (Botswana)		×									
PPC Cement (South Africa)		×		×			×		×		
Siemens AG (Germany)		×					×				
Nanotron (Germany)				×		×	×				
PPP PSL (Mauritius)	×	×							×		
Juhayna Food Industries (Egypt)		×	×	×						×	

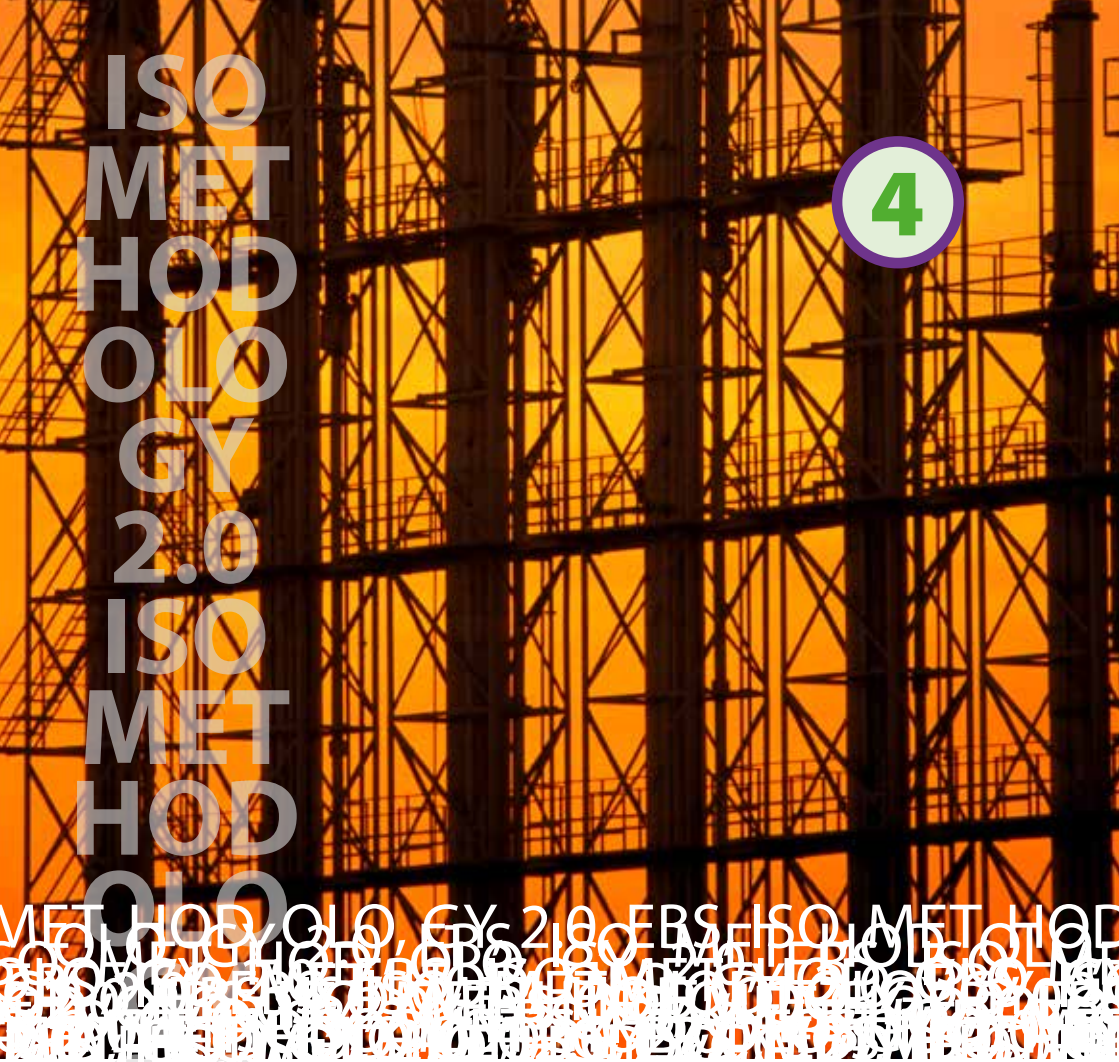
Business Functions (BFs) subject to case study assessment											
	Primary BFs					Support BFs				Additional BFs	
Companies/Countries	Inbound Log	Production	Outbound Log	M&S	After Sales	M&A	R&D	Engineering	Procurement	S&L	Retail
Petra Engineering (Jordan)		×		×		×	×		×		
Holcim Lebanon (Lebanon)		×		×		×			×		
Maga Engineering (Sri Lanka)	×	×							×		
Dalian Shipbuilding (China)							×				
Xinxing Iron Pipes (China)	×	×		×	×	×	×	×	×		
SDE (Senegal)		×		×	×	×			×		
Chococam (Cameroon)		×		×		×			×	×	
Mapei (Italy)		×		×	×	×	×	×			
TOTAL :	**6**	**18**	**2**	**13**	**3**	**8**	**9**	**3**	**11**	**3**	**1**

M&S = Marketing & Sales // M&A = Management & Administration // R&D = Research & Development // S&L = Storage & Logistics

Table 18 – Business Functions (BFs) subject to assessment in the case studies

3.2 Findings from industry sector case studies

A summary of the analysis and of the findings of the global automotive industry case study is given in Annex A.



Practical organization of case studies

4.1 Company case studies

For a listing of the key activities typically undertaken in cases studies and their organization, please refer to the project planning tool in the tool box (see **tool TB_10**).

There are three pre-requisites for the selection of a company:

- It must be a significant user of standards since several years (at least 3 years)
- There should be good relations with senior company management (to ensure access to company data and experts)
- It should be interested in an assessment and in the outcome of the study

To undertake an assessment of the impacts of standards on a company, make sure before you start that you have the staff, the time and the budget to conduct the project [1]. Have a preliminary idea of the scope of the study at an early stage – Is it likely to assess a single or a selected number of business functions within a company, a business unit or the company as a whole? Besides deriving your choice from an initial company analysis, you should also consider the following time and resource issues:

- **Capacity:** As the project requires intensive work, it is recommended that the person conducting the assessment (or the person responsible for conducting interviews and drafting the report, if a project team is established) works on it full-time. As a minimum, around 50 % of his/her time should be dedicated to the project.

1) Please consider that the **first project** will most probably require more effort than subsequent projects.

- **Time :** Based on the experiences gained in the case studies, a total duration of 3-4 months [2] should be assumed for the assessment of an organization. This may be longer or shorter, depending on specific factors.
- **Budget :** The budget required depends mainly on a) the location of the company and whether costs for travel occur, b) whether external consultants need to be hired and c) whether study reports need to be purchased (such as industry studies), d) whether allowances for internships of students are to be paid. If none is the case, the only cost factor is the working hours of staff involved in the study.

Establish a key contact in the company who is your **main contact for all issues related to the project**. This person may even formally become a member of the project team. Ideally, this person should have a position with some decision making power in the company, such as a director, deputy director or head of function, and should be well connected in the company. For many of the projects undertaken by ISO and NSBs between 2010 and 2012, the primary company contact was the head of the quality control or quality assurance business function. In most cases, this has proven to be an excellent choice.

Experience has shown that often there is some hesitation in companies with regard to disclosing certain company-internal information. Depending on the specific conditions, some information may not be needed in a project. It is recommended in any case to sign a "**Declaration of confidentiality**" in which the project team declares to abstain from this closing confidential information outside the project team and to submit a final project report to the company for approval

2) Please consider that the actual interaction with company experts may usually take much less time – typically around one week. However, significant time intervals tend to pass in subsequent iterations (e.g. for collecting new/missing data, feedback from company experts, approval of findings). This is the main reason for the longer time needed.

before publication. A template for such a declaration is part of the tool box (see **tool TB_11**).

Identify interview participants

To achieve the best results, it is recommended to interview 2-3 persons per business function, including the heads of each function or their deputies. Those interviewed must be well aware of which standards are applied in their function and how, and able to estimate the impacts of standards. If you analyze a business unit or a company, assess all functions separately.

Arrange a date and time for any meetings well in advance to give both sides the time to prepare adequately.

Interview scheduling

Start setting up the interviews well in advance, as heads of functions usually have busy schedules.

International interviews

If people from different countries are involved in the interviews, take into account the following :

- Differences in culture/hierarchies
- Holidays/vacation
- Language issues

Decide what type of interview is appropriate for your purpose. **Table 19** provides an overview of different types of interviews:

Selection of interview type			
Type of interview	**Advantages**	**Disadvantages**	**Recommendation: Appropriate if…**
Phone interview	• Time-efficient • Cost-efficient • Medium degree of interaction	• May produce less representative results than in a face-to-face interview due to lack of trust • For international calls, the sound quality might be an issue	…time and money are an issue …the interviewee and interviewer already know each other
Face-to-face interview	• Knowledge-efficient (highly efficient interviews in term of the outcome) • High degree of interaction	• Cost- and time-intensive	…interviewee and interviewer are geographically close to each other …quality of the outcome has high priority
Workshop	• Knowledge-efficient (highly efficient in terms of the outcome) • Highest degree of interaction	• Cost- and time-intensive	…two or more people can participate in the workshop and the quality of the outcome has high priority …participants wish to benefit from the meeting
Online questionnaire	• Time-efficient • Cost-efficient	• No interaction	…time and cost are limited …the survey is conducted in different companies all over the world …in addition to the other types of interviews

Table 19 – Different types and formats of interviews

Set dates according to the availability of the participants. Depending on the business function your interview partner belongs to, you may adapt your questionnaire. If you had already initial contact with interview partners before, you may consider sending a questionnaire

to the interviewees beforehand (e.g. one week), to allow them time to prepare. However, it is suggested to have a face-to-face contact first before sending a questionnaire to avoid possible misunderstandings.

Please note that the tool box contains two basic questionnaires for interviews (see **tool TB_13**).

Workshops

In some cases it may be useful to have a workshop bringing together various participants from the same or different business functions. Different options to organize workshops are shown in **table 20**:

Possible workshop methods
1. Brainstorming Collect all ideas about a topic as they come up, write them down and organize them at the end (e.g. for collecting all standards in a company)
2. Discussion rounds - Ask each workshop attendee to comment on an open-ended question. After this first round, encourage the attendees to challenge the statements - This method is very useful if attendees from different functions participate. It allows them to first get an insight into the opinions of the members of other functions, and also gives them space to discuss them
3. Voting If there is a choice to be made between different options (e.g. prioritizing value drivers), you can conduct a vote between the participants

Table 20 – Different methods for organizing workshops

Take notes

Always take notes during interviews and workshops.

Iterative process

It may be necessary to repeat or extend interviews in the light of additional data or inconsistencies of information obtained from different participants.

Obtain data

Keep in mind that the aim of the interviews and workshops is to quantify key impacts of standards on the business functions that are being analyzed. Questions and answers should ultimately lead to quantification in terms of EBIT impacts.

The quantification of the impacts of standards is the most critical (and often most difficult) step of the assessment process.

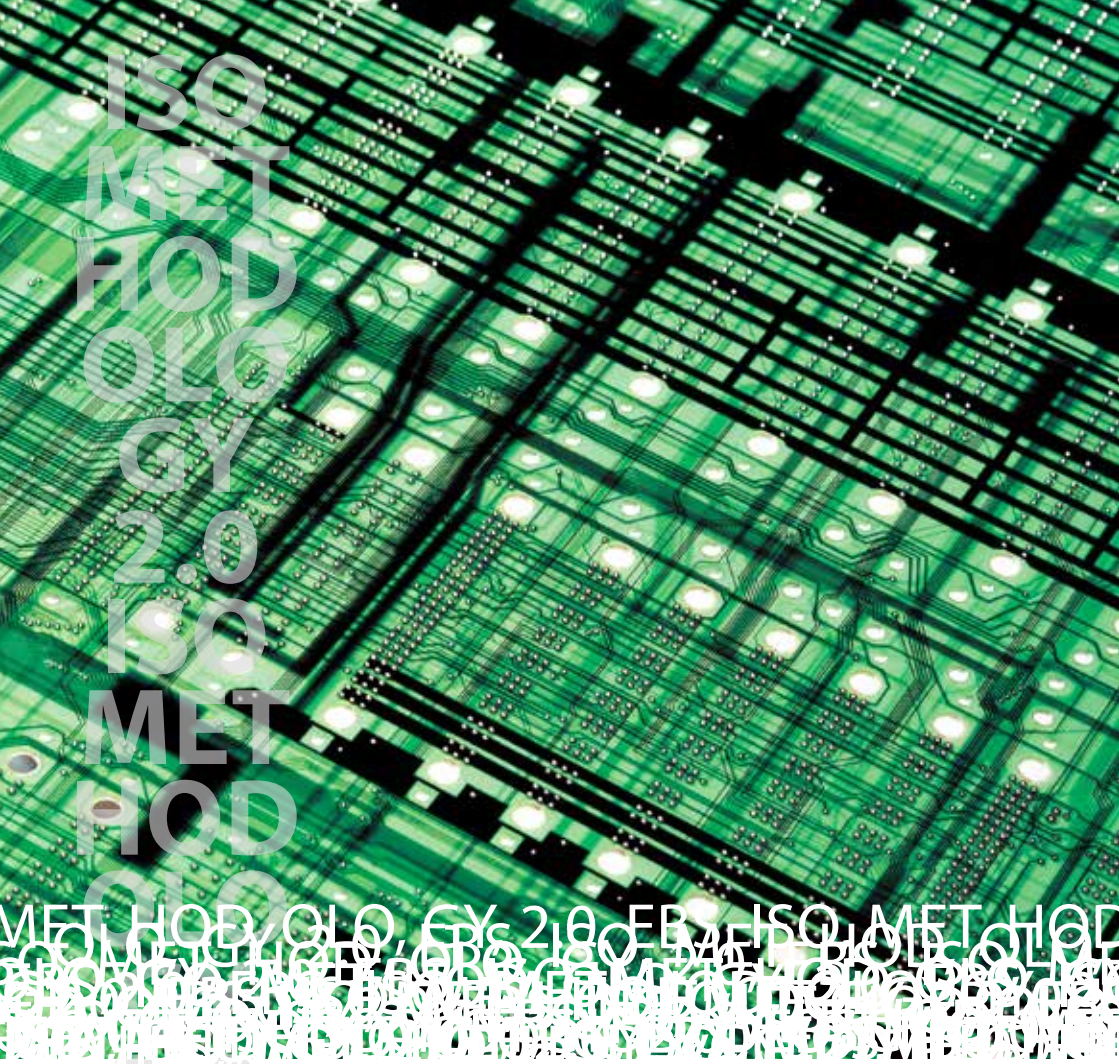
In many cases, the main difficulty concerns the availability of data. Most companies do not have specific data on standards impacts and, in the majority of cases, quantifications need to be made by the experts during the interviews. The attitudes of the company experts vary and some are more comfortable than others in providing estimates based on their knowledge and experience. The interviewers should help and encourage the company experts during the analysis, clarifying that approximate figures based on their best judgment are fully acceptable for this type of assessment.

Quantification and calculating impacts

The methodology contains a calculation tool, which allows registering data of the impacts of standards in financial terms and aggregating the impacts over all selected business functions to a total EBIT contribution of the standards (see **tool TB_09**).

Preparation of the final case study report

Summarize your findings in a final report. A reporting tool for case studies is contained in the tool box (see **tool TB_12**). Please follow this tool, but do not hesitate to adapt it wherever necessary.



Annexes

Annex A Assessment of economic benefits of standards to industry sectors

The ISO Methodology can be used to assess the impact of standards on industry-sectors and this section describes the approach and steps to be taken to that end.

The industry sector analysis is undertaken with the same approach as a company assessment. Results of the assessment of sample companies are aggregated to arrive at an evaluation of the impacts of standards on an industry sector.

Firstly, it is important to understand the industry value chain and to undertake an appropriate segmentation of the stages in the industry value chain.

Secondly, select a sample of companies that can represent the core segments of the industry value chain. For each of these companies undertake a company assessment which includes face-to-face interviews with company staff as described for the company assessment. After such assessments have been concluded or have reached an advanced stage, extend the assessment further by investigating additional companies of the relevant industry segments using less time-consuming approaches such as sending out survey questionnaires and conducting telephone interviews.

Before you engage in a sector assessment, ensure that you have the staff, time and budget to conduct such a project.

- **Capacity :** As the project requires intensive work, it is recommended that the person conducting the assessment (or the project leader if a project team is established) works on it full-time.
- **Staffing :** Depending on the amount of experience and knowledge of the project team, it may be advisable to involve additionally

industry consultants who can provide knowledge and details about the industry and its use of standards.

- **Time :** To quantify the impact of standards in a whole industry you will need realistically between four months and one year depending on the size of the industry, the geographical scope and the desired depth of the study.
- **Budget :** Calculate a budget for one and half full-time equivalent persons (possibly with assistance) for the time of the project, and a travel budget dependent on the size and geographical coverage of the selected company sample.

It is important to underline that at the time of publication of this document, the methodology had been applied to a single industry study, covering the global automotive sector (published in January 2010). This means that the experience gained to date is not yet comparable to that acquired for company case studies. We expect the proposed approach to be refined over time, on the basis of experience gained from new studies.

Key steps in an industry sector assessment

The assessment of the impact of standards on an industry sector is divided in three main steps : Preparation, assessment/aggregation of company data and evaluation of results (see **figure 27**).

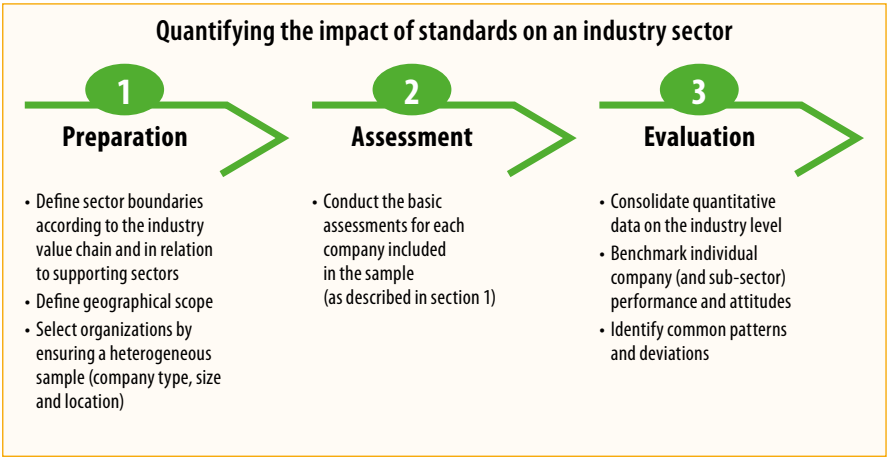


Figure 27 – Three steps in the quantification of the impact of standards in an industry sector

Step 1: Preparation

Define scope

The first requirement is a good understanding of the industry. This is achieved by analyzing the industry value chain.

Compared to a company case study, an industry sector study requires a deeper analysis of the industry structure and of its segments.

Initially, the industry is considered as a whole and it is particularly important to understand its boundaries. Typical questions to be answered are : What is the core of the value chain for the industry ? How many upstream and downstream value-added steps are to be considered ?

For example, raw materials are used by most manufacturing companies within a large variety of sectors. However, they are often considered just as input – in most cases all the activities related to finding, extracting and processing such materials are not part of the core value chain of the manufacturing sectors using them.

Consider the pharmaceutical manufacturing industry as an example (see **figure 28**). The pharmaceutical industry develops, produces, and markets drugs or pharmaceuticals licensed for use as medications. This industry is actually a part of the broader chemical industry, which can be subdivided into upstream basic and fine chemical industry. The upstream basic chemical industry produces large volumes of basic chemical products. The fine chemical industry produces complex, single, pure chemical substances in limited volumes and at relatively high prices. Fine chemicals are used as starting materials for specialty chemicals, particularly pharmaceuticals, biopharmaceuticals and agrochemicals.

The pharmaceutical industry can be further subdivided in sub-sectors. Looking from another perspective, it can also be considered as part of the health care industry.

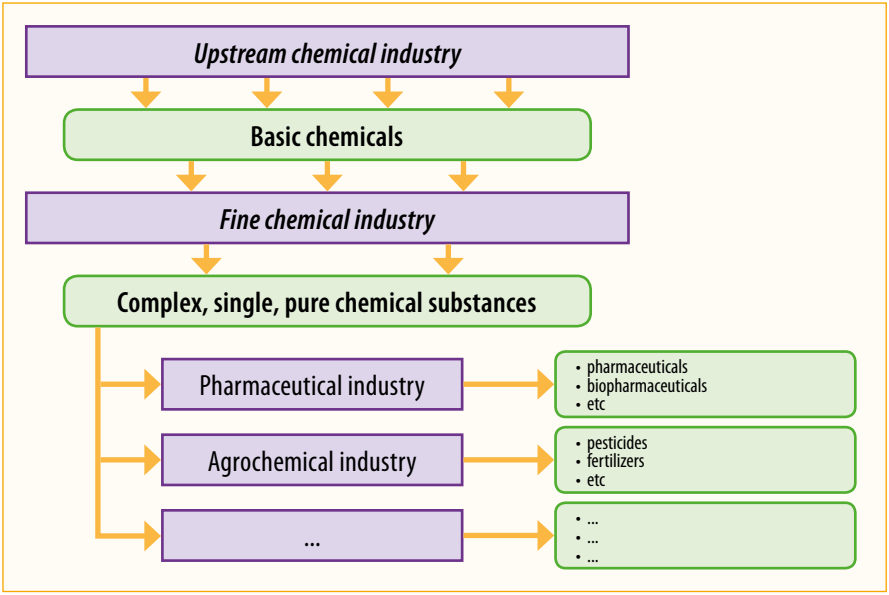


Figure 28 – The chemical and related industries and their outputs

Which industry and which core segments of an industry should be considered ? This depends on the objectives and constraints of each project. The analysis will help to identify the various components of the industry and possible overlaps between segments and companies, with a view to define clearly distinct sectors.

For this purpose, it is recommended to consult industry experts, industry associations, industry classifications, such as the International Standard Industry Classification of All Economic Activities (ISIC) of the United Nations Statistics Division, as well as key reference materials published by national, regional and international agencies.

An overview of key industry classifications is given here :

http://en.wikipedia.org/wiki/Industry_classification

When developing an industry value chain, it is possible to test it applying the approach described for the company value chain and try to identify key types of suppliers and customers for each of the segments in the industry value chain.

Another critical aspect concerns the definition of the geographical scope of the study, which can be national, regional or international, depending on the objectives and resources of the project.

Once the industry boundaries and geographical scope have been defined, the analysis will explore in more detail the value chain of the specific industry, considering its internal structure (sub-sectors, inter-sector relations and interfaces).

The main *company types* need to be identified (i.e. companies focused on one or more segments of the value chain), along with other relevant company characteristics (e.g. size, geographical coverage). Key players (and their relations) in the main industry segments need also to be mapped.

The scope of the analysis is then finalized by selecting the segments of the industry value chain considered most important or most promising in terms of contribution to the industry value creation, from the perspective of the potential impact of standards.

Example from the global automotive sector study

Given the complexity of the industry and the available time and resources, it was not possible to differentiate by *type of vehicle*. The scope of the study was therefore restricted to the *car segment* of the industry.

For the purposes of the study, the scope of the sector was further restricted to its core segments, characterized by specific company types (parts suppliers, car manufacturers, dealers, engineering service providers and manufacturing service providers) covering, with a different level of detail, the core elements of the sector value chain which are highlighted in **figure 29**.

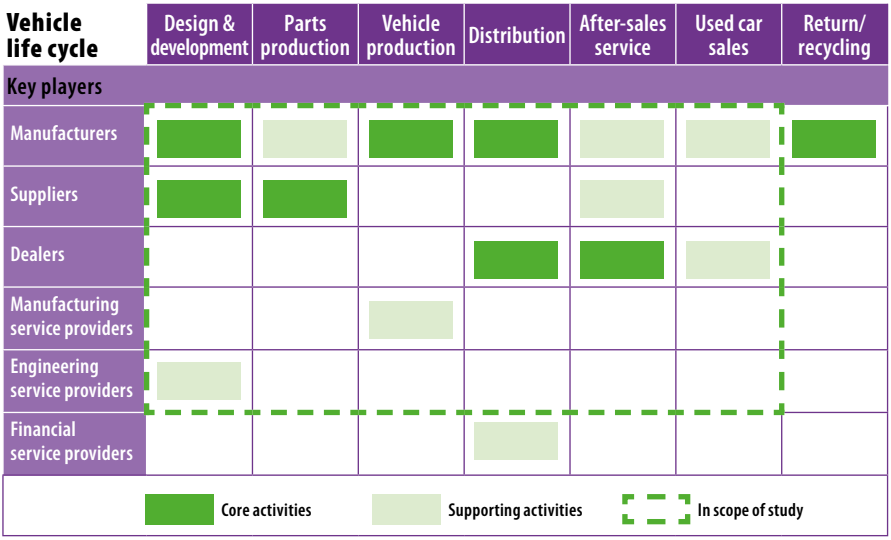


Figure 29 – Automotive value chain and scope of study

The study had a global scope. Therefore, the most important geographical regions for the sector – in terms of volumes of production and number of customers – were included in the study, which are North America, Europe and Asia.

Select companies for the assessment

The assessment was conducted using a sample of companies that represent the industry sector. An effective sample[1)] can be set-up by:

- Selecting a heterogeneous set of companies, covering all the company types matching the industry sub-sectors in scope
- Ensuring a balanced representation of companies, in terms of market share, geography and size

Example from the global automotive sector study

A representative sample was selected considering *the distribution of value creation in the industry*, the *geographical coverage* and the *size of companies*. The result is highlighted in **figure 30** (the sample included more than 50 companies: the length of the bars represents the number of different types of companies or organizations from the indicated regions).

1) For the purpose of this analysis, an "effective sample" is considered a sample of companies where the main different company types and geographical regions are represented in a balanced way. This normally allows a good qualitative understanding of the sector, and to perform useful quantitative estimates. If the objective of the study is to operate precise sector-level quantifications, higher levels of representativeness of the sample need to be considered: e.g. the sample should account for a certain percentage of the total industry sales or market share, or include a statistically relevant number of companies for the main company types.

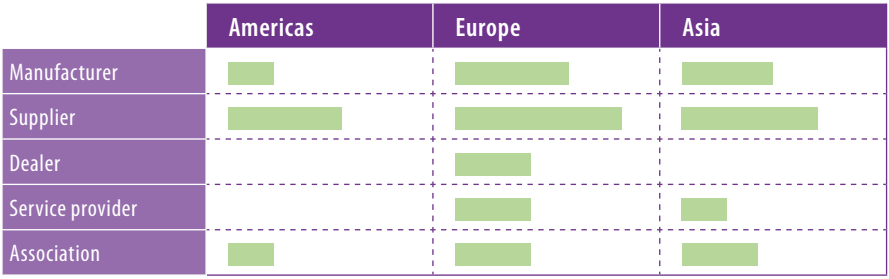


Figure 30 – Field study sample – Companies/organizations and regions

Step 2: Conduct assessment of the sample companies

The assessment of most of the individual companies in the sample is carried out as described under **section 1.5**.

Two main differences, however, need to be considered:

- The learning curve effect: The understanding of the sector and of the impact of standards on the companies belonging to it will grow with the number of companies interviewed. Therefore, after having identified some critical aspects through the first interviews, these findings can be applied in the following interviews to speed-up and refine the undertaking and to validate some of the previous findings. **Value drivers, types of standards impacts, operational indicators, examples of calculations** are the most important aspects benefitting from this effect.
- The organization of field studies: A relatively limited number of face-to-face interviews can be planned, which will then be complemented by phone interviews and online surveys. The latter can be organized in the second phase of an assessment project, using questionnaires focused on a limited number of key questions, which were developed on the basis of the knowledge and experience acquired through the first cycle of face-to-face interviews.

Example from the global automotive sector study

Value drivers

Value drivers are considered in order to set the right focus in assessing the impact of standards. If a direct impact of standards on a value driver is identified, it is given high priority in the assessment.

Through desk research, input from consultants and discussion with company experts the main value drivers for companies in the automotive industry were identified as **innovation**, **efficiency** and **marketing**. Their importance varies for different company types in the industry value chain (as shown in **figure 31**) : for manufacturers, the production process and marketing activities are the key value drivers.

For the suppliers, technological innovation and the flexibility to adapt to the manufacturers are essential. Dealers are very much dependent on the marketing activities of the manufacturer but also need to attract customers themselves, and so on.

Value driver	Manufacturer	Supplier	Dealer	Manufacturing service provider	Engineering service provider
Technology innovation					
Lean manufacturing					
Quality of production processes					
Logistics capability					
Product strategy					
Flexibility to adapt to customer					
Brand awareness					
Economies of scale					

Figure 31 – Industry value drivers

This general picture was used to guide the interviews with the companies in the sample.

Impact of standards

The way and extent to which companies are affected by standards vary by company type and function, as illustrated in **figure 32**.

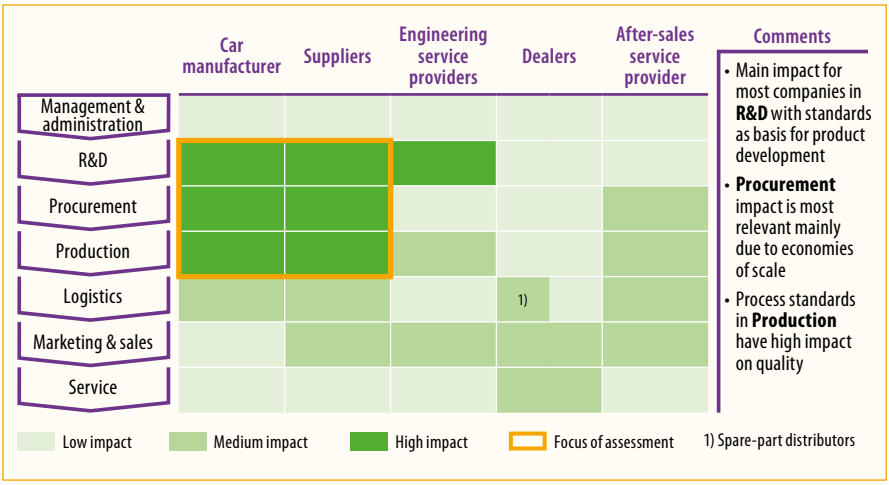


Figure 32 – Intensity of impact from standards by company type and function

The analysis was focused on the following company types and business functions for which it had become apparent that standards have the highest impact:

- **Company types:** *car manufacturers and parts suppliers*
- **Business functions:** *research and development, procurement and production.*

Step 3 : Evaluation : aggregate company data and evaluate results

After conducting the assessments of the individual companies included in the sample, the contribution of standards to the company EBIT will be determined for each company, supplemented by other qualitative information on the impact of standards.

The individual company data need then to be used to obtain industry sector outcomes. Two levels of analysis can be pursued :

- Estimation of a cumulative value of the impact of standards on the sector (contribution to the total gross profit of the sector) by aggregating individual company data
- Evaluation of the relative performances in the use of standards for the various types of industry players (benchmarking)

Estimate the contribution of standards to the industry EBIT

The aggregation of impacts at the industry level is determined as follows (see **figure 33**) :

1. Define reasonable categories for the aggregation. " Company type ", i.e. belonging to a given industry segment, represents the first choice. This means that data will be first combined for the companies belonging to a given industry segment, and then at the whole industry level.
2. Calculate the average of the total impact of standards on the different company types, weighted by the total EBIT. To do this, consider company type 1. Take the EBIT impact of each company of type 1, and divide it by the company's current EBIT. Sum up these values for all the companies of type 1, and then divide the total by the number of companies of type 1 assessed. Repeat this for all the company types assessed.

3. Finally, multiply the value obtained in **step 2** for each company type, with the total EBIT of the corresponding company type. Then add up those final EBIT impacts per company type to get the total industry EBIT impact.

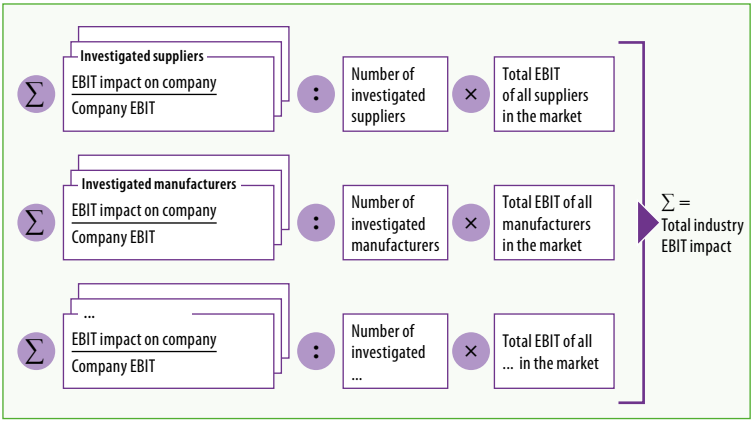


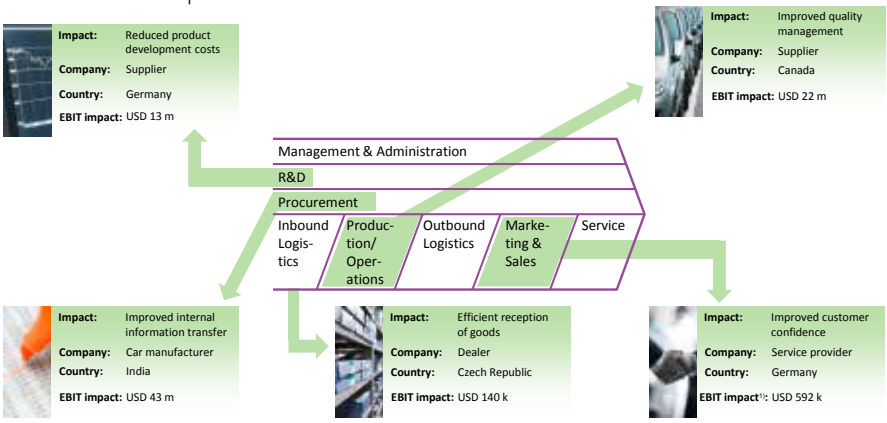
Figure 33 – Calculation of EBIT impact at industry level

Other parameters might be used as weighting factors to support the aggregation of data – e.g. market capitalization. The choice of parameter may depend on external factors such as industry trends, the current economic situation, etc.

Example from the global automotive sector study

Standards impact on the core business functions.

Impacts from standards on the core business functions (R&D, procurement, manufacturing – complemented, in some cases, by marketing and sales) were calculated for the companies in the sample belonging to the two most important company types (car manufacturers and parts suppliers). **Figure 34** visualizes the results for some of the companies assessed.



Source: Roland Berger

1) Assuming 5% EBIT margin

Figure 34 – Model cases of the impact of standards

For each company, the impact of standards on the three core business functions was divided by the total revenues of the companies. The weighted average of these ratios was than taken for each company type and core function. Since the estimates were derived from a relatively small sample size, the results were given as a range with the lower bound being 70 % of the estimated values.

The total impact on the three core functions was then expressed as a percentage of revenues for the two most relevant company types : original equipment manufactures (OEM) and suppliers. This allows

the estimation of the combined effect for the two company types[2] and then, considering the relative weight of their market segments, the total impact at the industry level.

Benchmarking

Various levels of analysis can be conducted on the basis of the quantitative and qualitative data collected.

A first level, based on the quantifications, concerns the industry segment (" company types "). It is possible to rate the relative impact of standards for the various industry segments and to look for qualitative information to understand if and why standards have different impacts on the various industry segments. This type of analysis can also be conducted considering different company groupings (e.g. companies of a given size or geographical region).

A second level, also based on the quantifications, is focused on the business functions. It is interesting to evaluate the relative impact of standards on the main business functions analyzed, and to investigate possible differences among industry sectors.

A third level is focused on individual companies, comparing companies within industry segment and within the whole industry. Individual company impacts can be mapped, identifying various performance levels. This information can be combined with other information – in particular, the position of the company in the value chain, its power within the industry, its attitude towards standards and its capability in using them.

This analysis can be used to position companies in the industry, to understand how industry and company specifics can influence the ability of a company to take value from standards and to identify

2) Some of the impacts e.g. for the procurement function need to be subtracted to avoid double-counting in the aggregation (details can be found in the full report).

industry leaders in the use of standards versus followers and those who are unaware of the benefits of standards (see **figure 35**).

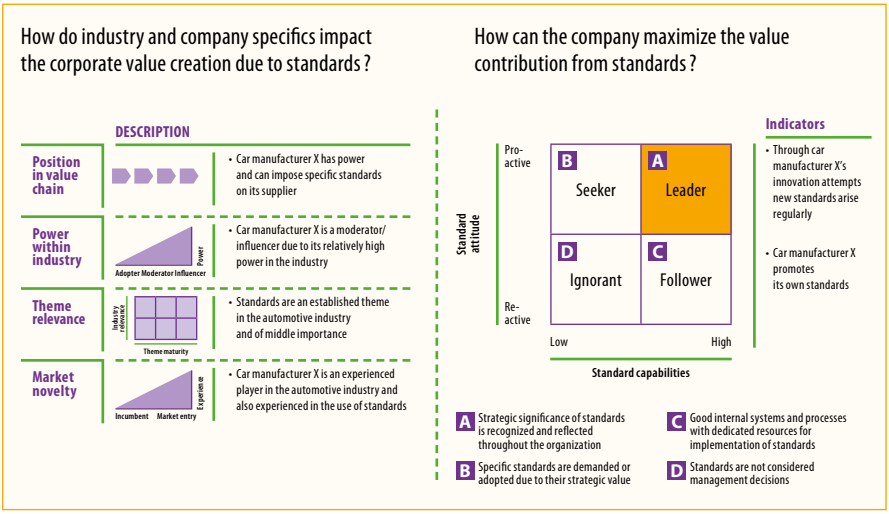


Figure 35 – Analysis of the attitude of a company with regard to standards

Findings from the global automotive industry case study

The field study sample was designed to cover a variety of company types, sizes and geographical locations as shown in **figure 36**.

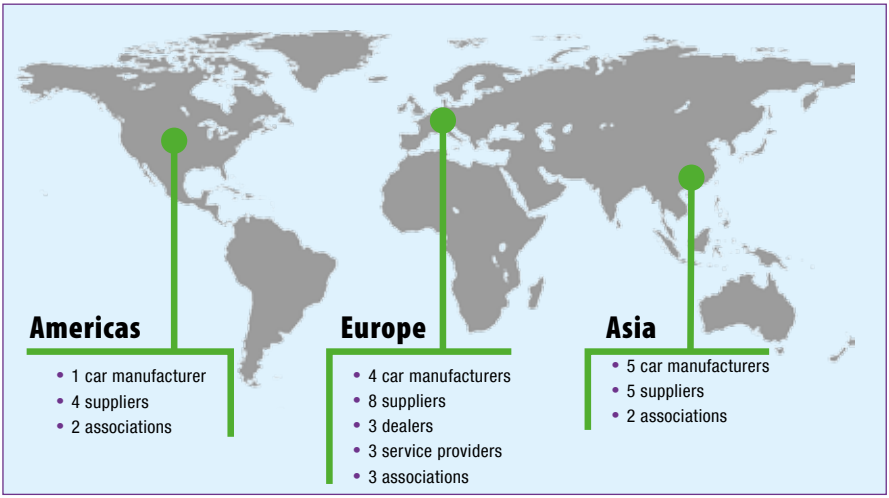


Figure 36 – Geographical distribution of the companies involved in the case study of the automotive industry

The study revealed that standards affect **procurement functions** as follows:

- They help car manufacturers and suppliers reduce the variety of supply categories, with a positive impact on costs (making it possible to purchase in larger quantities)
- They help to make the procurement process more efficient (decreasing the time needed to manage the process), and simplify contractual agreements
- Standardized components, even if they only account for a limited portion of the car, are offered at lower prices.

Standards' impact on the **research and development** and **engineering** functions include :

- Lower research costs from defined material and test standards
- Reduction of product development costs varying, depending on the level of adherence to external standards by car manufacturers. The closer company standards are to external standards, the higher the costs savings
- Supply costs are reduced, since specifications are more easily met by potential suppliers
- Process standards positively impact product development costs. For example, when combined with a range of defined testing standards, quality management systems lower costs and achieve comparability on the market for suppliers.

For the **production function**, the main impact comes from quality management standards, both for car manufacturers and suppliers (as well as for some service providers) :

- Measurable improvements result from quality management standards such as ISO/TS 16949, *Particular requirements for the application of ISO 9001:2000 for automotive production and relevant service part organizations*

Car manufacturers can also better integrate suppliers into their supply chains. Using data gathered through interviews, various types of data aggregation and estimates have been performed, including :

- Aggregation of impacts from standards on core business functions (R&D/engineering, procurement, production) for a single company
- Aggregation of total impacts from standards for a company
- Estimate of the total impact from standards on one of the core business functions for the entire industry
- Estimate of the total impact from standards for the entire industry. A variety of company cases were considered in the study. The

results show an incidence of the i**mpact from standards ranging from 0.15 % to about 3 % of turnover** – depending on the company and the business function analyzed.

The estimate of the total impact from standards on the three core business functions for the entire industry has been given in percent of revenues for the two most relevant company types, manufacturers (OEMs) and suppliers (see **figure 37**). Since the estimates have been computed from a relatively small sample size, the results are given as a range with the lower bound being 70 % of the estimated values.

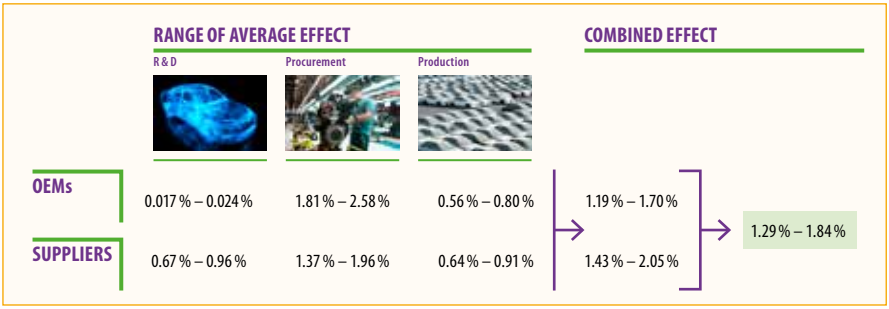


Figure 37 – EBIT contribution of standards in the global automotive industry for different segments of the industry value chain

To give a better appreciation of the scale of the standards impact, the above estimate has been projected to the total industry revenues for 2008. As a result, **the total contributing impact would be between USD 38 billion and USD 55 billion**.

This estimate is based on a limited sample of companies and to achieve more precise and reliable figures, it should be refined and validated using a larger sample. However, the analysis provides a clear and valid indication of the scale of the standards' contribution to the sector.

Annex B Assessment of non-economic benefits of standards

In the first version of the ISO Methodology (2010) the assessment of economic benefits of standards was directly related to companies from the private sector.

Organizations from the " public sector " are also affected by standards and it was observed that most of the methodology could be applied in a similar way as in the private sector. However, the methodology had to be adapted to address the specifics of a public sector institution, whose primary mission is (in general) devoted to create societal value rather than economic value.

This approach appears in the meantime as being too narrow. It is more coherent with current developments in business and society (driven by the importance of sustainability) to use an analytical framework that can distinguish between :

- *Economic benefits* of standards
- *Non-economic benefits* of standards (i.e. the contribution of standards to social and environmental benefits)

This is an approach applicable to any type of organization irrespective of whether it is a private for-profit, private not-for profit, a public sector, or another form of organization.

Economic and non-economic impacts of standards are seen as different aspects in which standards contribute to an organization and to the environment in which it exists, irrespective of the type of organization.

4.1.1 Overview

The assessment of non-economic benefits of standards faces a higher level of complexity.

The main reason is that the analysis needs to :

- Identify and quantify the performance of the organization to be assessed in relation to non-economic results (through key measures that are, as much as possible, as clear and effective as it is " gross-profit " for measuring economic performance),

and, at the same time, to

- Describe and quantify the contribution of standards to such results.

All organizations have in place management and accounting systems tracking economic performances (income and cost are defined, or can be defined for almost all organizations' activities). However, social or environmental performance are, in the vast majority of cases, either not defined and measured at all, or in a limited way.

Basic approach of the assessment

To start, a preliminary, high-level analysis needs to be conducted to identify the relevant social and environmental aspects of the organization's operations. It is possible that these are part of the organization's core business, or that these can be associated in various ways with the company operations.

In the first case, the core business of the organization is oriented towards achieving social or environmental goals in a direct way. This is the case for many public sector organizations, such as civil protection agencies whose core mission is to provide disaster prevention or relief, environmental agencies whose core mission is to support or enforce environmental protection, health care institutions such as a

hospital [1], whose core mission is to save lives and heal patients, and so on. But it is also the case of not-for-profit organizations providing health care, social or environmental services, social businesses [2], etc.

In the second case, the organization pursues a conventional, mostly for-profit business and social and environmental aspects are linked to the organization's core business activities.

For the assessment, it would be very helpful if the organization is already aware of the social and environmental implications of its activities, or, in an ideal case, has already put in place (or is willing to develop) a management system supporting measurement and reporting of performance across the **organization's "triple bottom line"** (economic, social, environmental). This could be achieved by applying some of the most widely used reporting guidelines for such purposes, such as those of the Global Reporting Initiative (GRI).

In any case, it is essential to define and identify the social and/or environmental aspects of an assessment to ensure a clear scope is applied.

To keep the analysis focused and manageable, it is recommended to define key measures to characterize the social and environmental performance of the organization in the areas that have been selected for the assessment. These measures will have a role similar to EBIT in the assessment of economic benefits.

Depending on the specifics of the organization and of the context in which it operates, it may be possible to combine some specific indicators into a general measure, e.g. to define a composite social value measure for "labour" by combining in an appropriate way

1) A hospital can also be a private institution – an organization that can provide health care services in an efficient way and make a profit on that. However, the primary goal of such an institution is (or at least should be!) to provide social value.

2) According to the definition of Prof. Muhammad Yunus, "*a non-loss, non-dividend company designed to address a social objective within the highly regulated marketplace of today*".

specific indicators related to this issue. Alternatively, it may be more appropriate to select one or a few specific indicators that are highly relevant for that company – e.g. GHG emissions as the key measure of environmental performance.

The assessment can then be conducted following the same approach that is applied in the evaluation of economic benefits of standards (starting with an analysis of the organization's value chain, business functions, impacts of standards, value drivers, operational indicators, etc.). A summary and high-level overview of the steps towards the assessment of non-economic impacts of standards is given in **figures 38** and **39**.

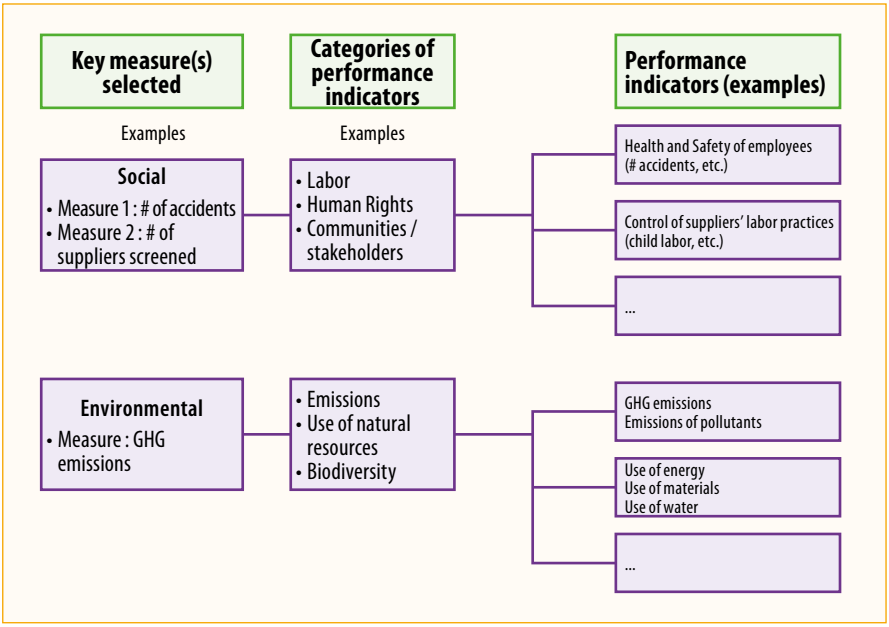


Figure 38 – Definition of key measures to assess non-economic (social and environmental) impacts of standards

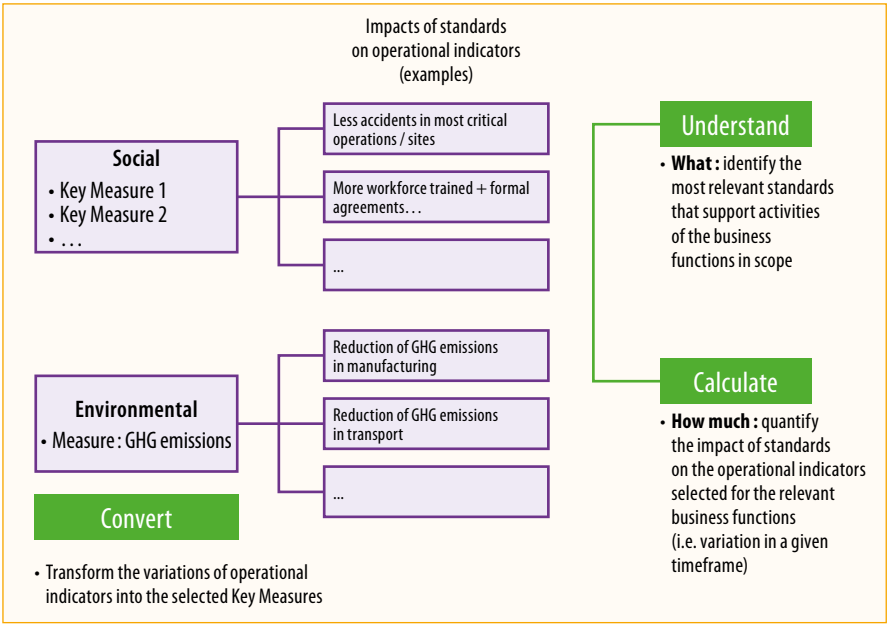


Figure 39 – The impacts of standards on operational indicators are converted into impacts on the selected key Measures of environmental and social performance

The following section gives an example of a possible extension of the ISO Methodology to address organizations whose primary goal is to create social or environmental value with a focus on hospitals.

The assessment process

Step 1 : Understand the value chain

In hospitals, as in most of the healthcare industry (including pharmaceutical companies), the key activities can be organized around the phases a patient goes through during treatment in a hospital. This is commonly referred to as the " patient flow ". As a result, the value chain for the hospital industry can be designed on the basis of the

patient flow which is supported by administrative and infrastructure functions as shown in **figure 40**.

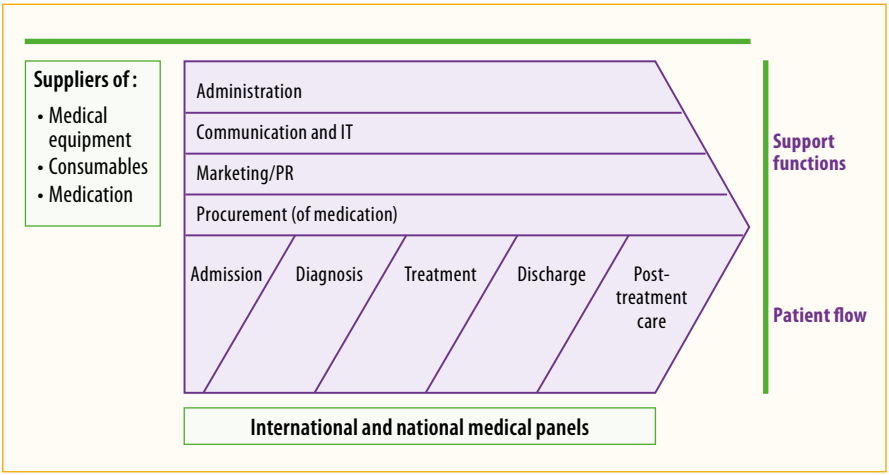


Figure 40 – Hospital value chain

For the sake of simplicity, the scope of the analysis was restricted to the services provided by hospitals. These services include all eHealth (electronic health services) aspects covered by hospitals, but exclude medical equipment supply (pharmaceuticals and medical devices).

Step 2: Identify the impacts of standards

In this step, we identify the relevant functions and the significant impacts within the selected business functions of the hospitals.

We suggest an analysis, based on desk studies and interviews with staff of the hospital. It may be useful to refer to the generic Standards Impact Map (see **section 1.5**) – as far as possible and meaningful – to identify the relevance of functions and the impacts of standards.

This needs to be supplemented with the identifications of impacts on the business functions that make up the hospital value chain.

In the example case study, the following overview of value drivers and relevant types of standards was used as a starting point for the analysis (see **figure 41**):

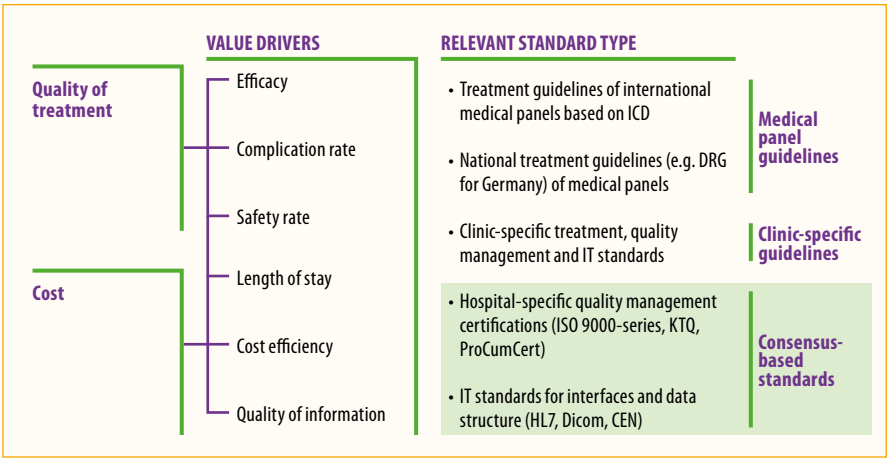


Figure 41 – Value drivers in the hospital value chain and standards used

Treatment, the core function of hospitals, is mostly affected by medical best practices and guidelines set by international medical panels. Consensus-based standards are less relevant.

In medication procurement, consensus-based standards are mostly related to medical devices and pharmaceuticals, which have been excluded from the scope.

In administration, consensus-based standards can have a relevant impact, because length of stay is not only a result of the treatment or medication itself, i.e. a low complication rate, but also of quality and efficiency of processes, which are directly linked to quality system management practices.

For example, a shorter admission time can bring significant productivity gains. In surgical wards, it has been shown through empirical studies that it is related to a lower complication rate. Another example of a

meaningful impact is the improved documentation flow during surgical procedures after the introduction of quality management standards.

In-depth interviews were conducted in two supporting functions, medication procurement and administration.

Step 3: Analyze the value drivers and determine operational indicators

a) Value drivers

The key value driver categories identified were *quality of treatment and cost*. During the interviews, the value drivers were gradually refined. The value drivers selected after the interviews are highlighted in **figure 42**:

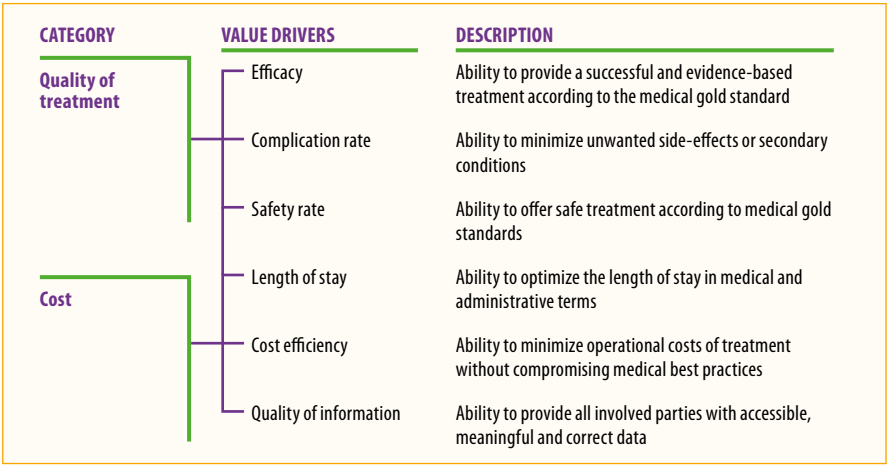


Figure 42 – Value drivers and their impact in the hospital value chain

b) Operational indicators

As stated above, the patient flow is at the core of the hospital value chain. Alongside, there are several administrative support functions, such as procurement of medication or quality management.

In interviews with medical doctors at Helios[3] and HSK[4], the procurement head and the quality manager of HSK, as well as two eHealth experts, the following indicators emerged for procurement of medication (see **table 21**):

Value drivers and indicators : Hospital – Medication procurement		
Value drivers	**Indicators (examples)**	**Importance in generating procurement value**
Efficacy	• Overall survival rate • Median to treatment endpoint • . . .	High
Complication rate	• Patient complications per treatment course • Medication application mistakes • Mortality • . . .	High
Safety	• Toxicity • . . .	High
Cost efficiency	• Complexity of products • Numbers of suppliers • Reliability of suppliers • . . .	Medium
Length of stay	• Average length of stay • . . .	Low
Quality of information	• Documentation rate • Feedback rate • Access points to information	Medium

Table 21 – Value drivers and related indicators for procurement in a hospital

Even in procurement and without further analysis, the high importance of the quality of treatment becomes clear.

3) The Helios Hospital Group (Germany) is one of the largest and medically advanced hospital groups in Europe. It consists of 72 hospitals, 50 acute care hospitals and 22 rehabilitation centers

4) HSK, Dr. Horst Schmidt Clinic GmbH is the municipal hospital of Wiesbaden (Germany). It comprises 21 specialist clinics, four institutes and 1027 beds.

Step 4: Assess the impacts and calculate results

The preliminary analysis dedicated to hospitals did not allow to complete the assessment and to quantify the benefits of standards for one or more institutes. Nevertheless, a number of interesting facts and figures were collected, along with qualitative considerations, which are reported below.

KTQ certification is a consensus-based quality management system designed to cater to the specific medical and legal environment in Germany. When it was re-certified in 2006, the Klinikum St. Marien in Amberg (Germany) used the momentum that re-certification brought along to revamp its whole surgical documentation procedure, from admission in surgical wards to post-operative pain and decubitus management.

It involved more than 750 employees. Within one year, the outdated paper documentation with poor-quality information was replaced by a database with one digital record per patient. The surgical processes, previously virtually undocumented, now have a documentation rate of 100 %.

It is now possible to evaluate and compare core processes such as surgical ward admission time in minutes or the quality of post-operative pain management in terms of average pain scores. The hospital was granted an award by KTQ for outstanding performance.

The following considerations emerged from discussion with experts from hospitals :

1. *The level of process standardization is still low in hospitals and there are still large potential gains to be made from consensus -based standards in the management of hospitals and in the public sector in general.*

Compared to institutions in the private sector, the level of professional management procedures is strikingly varied among hospitals. For instance, electronic health records (EHR) are still highly hospital-specific.

2. *The low level of process standardization coupled with increasing cost pressure highlights emerging issues of standard-setting.*

In discussion with procurement and e-health experts, "clinical pathways" were mentioned as an area in which consensus-based standards could be helpful in the future. Clinical pathways are predefined best practices for treating and managing very frequent patient issues. They involve not only treatment guidelines, but also (quality) management aspects, for instance admission time. Implementing clinical pathways is inconceivable without standardized eHealth support, such as electronic health reports. Standards-setting organizations could have a significant role and provide tools built on consensus-based standards.

Annex C ISO Methodology toolbox

The toolbox is composed of presentations, spreadsheets and document templates. Each of the tools is identified with an ID and can be downloaded from : www.iso.org/benefits_of_standards.

A. Presentations

The presentations comprise the following :

TB_01 : Overview of the ISO Methodology

Description : Introductory presentation of the key elements of the ISO Methodology with a focus on company assessments, the organization of case studies and main results obtained in these studies about the impacts of standards.

TB_02 : Practical assessment : Steps and calculation of results

Description : An overview of the main approaches to calculating the impacts of standards and the frameworks for the determination before and after standards have been applied.

TB_03 : Process mapping tool

Description : An introduction into process mapping with some examples which can be copied and applied in the development of process maps in new studies.

TB_04 : Industry value chains – Examples

Description : These are examples from case studies published by ISO in 2011 and 2012. The collection of examples aims at providing some

cases that show how value chains have been constructed. These examples may provide guidance for future studies.

TB_05: Company value chains – Examples

Description: These are examples from case studies published by ISO in 2011 and 2012. The collection of examples aims at providing some cases that show how value chains have been constructed. These examples may provide guidance for future studies.

TB_06: Process maps – Examples

Description: These are examples for process maps published by ISO in 2011 and 2012. The collection of examples aims at providing some cases that show how process maps have been constructed. These examples may provide guidance for future studies.

B. Spreadsheets

TB_07: Standards Impact Map

Description: This map gives an overview of likely impacts of standards on the basis of the company value chain. The impacts are listed and defined to allow an easy check with regard to their relevance in a specific case study. It should be noted that the impact map is not exhaustive and that it is not possible to capture all possible impacts in such a list. Additionally, it should also be kept in mind that for a specific company only a subset of impacts will be relevant.

TB_08: Value drivers map

Description: A list of value drivers that have been identified in the case studies. It should be noted that this list cannot be exhaustive and that for a specific company only a subset of value drivers may be relevant.

TB_09: Calculation and aggregation tool

Description: This consists of two parts. Part one contains a number of examples for calculations that occur frequently in the calculation of the impacts of standards. It allows entering data for a specific project, so that the calculation principles are applied to the project-specific data. Part two allows summing up of all EBIT-contributions from standards in order to arrive at a final overall value for the contribution of standards.

C. Document templates

TB_10: Project planning tool

Description: This tool gives an overview of key activities that are typically undertaken in assessment projects. It is suggested to specify for each activity the person(s) responsible and the planned or factual starting and closing date. The list of activities may have to be adapted to specific projects.

TB_11: Declaration of confidentiality

Description: In order to undertake an assessment of the impacts of standards on an organization, it may be necessary or beneficial to share confidential information of the company within the project team. This team may comprise individuals from the national standards

body, an academic institution or a consultancy. In order to assure the company that no confidential information is disclosed outside the project team and that no such information is included in the final project report, it is suggested that the project partners sign a declaration of confidentiality at the outset of a project.

TB_12: Reporting tool for case studies

Description: This tool defines a structure for the final report about the assessment of the impacts of standards. The tool is intended to make sure key information is captured in the report. Applying a common structure also allows to compare findings between different reports. The reporting tool can be adapted to the special needs of a case study.

TB_13: Questionnaires to assist in company interviews

Description: There are two questionnaires provided in the toolbox. **Questionnaire 1** is aimed at capturing general data about the company or organization. **Questionnaire 2** addresses the use of standards by the company and assists in capturing key information from the company. Both questionnaires are generic which means they can be used irrespective of the type or size of a company, its industry affiliation or the business functions being assessed. Additionally, there is a set with nine questionnaires each of which is specific to one of the business function in Porter's value chain model. These questionnaires may have to be adapted before they are used in interviews or surveys in a specific case study.

Annex D Terms and definitions

Note : Some definitions related to standards and standardization have been simplified for practical reasons from those included in ISO/IEC Guide 2, *Standardization and related activities – General vocabulary*.

TERM	DEFINITION
Activity	In the value chain each activity in an organization is assigned to one of the functions in the value chain
After-sales service	One of the nine business functions in the model value chain developed by Porter, including maintenance, warranty, possibly training and other services
Approximation	A method to estimate the value of indicators in cases of missing or incomplete data for those indicators
Business function	An organizational unit of a company dedicated to a specific set of activities, such as research & development
Business unit	An organizational unit of a company that comprises the company's entire business for a specific product (or service) group
Company standard	Standard that has been developed and is owned by a company and is not shared with other interested parties
Compliance standard	Standard that defines restrictions on products and services or requires specific performance levels to match health, safety and environmental protection (HSE) requirements
Documentary, voluntary, consensus-based standard	Standard that • has been developed in an open process on the basis of consensus between the participants • is voluntary towards its use • is accessible and open for use by any interested party (irrespective of whether the party has participated in its development)
EBIT	**E**arnings **B**efore **I**nterest and **T**ax. A measure for the gross profit of a company. Contribution to EBIT is applied as the key indicator for the measurement of the impacts of standards
Engineering	One of the nine business functions in the model value chain developed by Porter related to the set-up and fine-tuning of often sophisticated equipment and processes

TERM	DEFINITION
Function or Business function (in a value chain)	Set of key activities in an organization that can be aggregated and that compose one of the components of an organizational value chain. For each function a number of activities is defined
Grey spot	Segment in a value chain under analysis for which required data are only partially available or available without the required quality
Inbound logistics	One of the nine business functions in the model value chain developed by Porter with the function of receiving inputs from suppliers, incl. checking these inputs with regard to quantity, quality, timely delivery etc.
Management and administration	One of the nine business functions in the model value chain developed by Porter, including all management functions across the company and administrative functions such as financial, human resources etc. management
Marketing and sales	One of the nine business functions in the model value chain developed by Porter with the function to market and sell products and services, incl. customer analysis, pricing, advertising etc.
Operational indicator	Indicator applied to the operations of an organization that can be observed and whose impact can be measured. Indicators need to be selected that reflect the impact of standards. The results from the measurement of the impacts of selected indicators are then translated and combined to an overall value resulting from the use of standards by an organization
Organization	Generic designation for all types of institutions, such as companies, public sector organizations, government agencies etc.
Outbound logistics	One of the nine business functions in the model value chain developed by Porter with the function of delivering products to customers, which may include interim storage, packaging, loading to transport facilities etc.
Private sector organization	Organization that is oriented towards generating profits, a business
Process standard	Standard that provides specifications for processes in terms of activities and process flows, process performance requirements and indicators, and process management practices
Procurement	One of the nine business functions in the model value chain developed by Porter with the function of supplier management, supplier and supplies contracting and ordering
Product standard	Standard that provides specifications for products and materials in terms of physical and chemical properties, interfaces and underlying test methods, terminology or categorization

TERM	DEFINITION
Production / Operations	One of the nine business functions in the model value chain developed by Porter with the function of producing or providing goods and services
Public sector organization	Organization that performs a function for the public and is not primarily oriented towards generating profits
Regulatory (mandatory) standard	Standard that is part of regulation (in a territory, such as a country, a province, a county etc.) and mandatory with regard to its implementation
Research and development	One of the nine business functions in the model value chain developed by Porter with the task to research new products and technologies. mostly for new product or service development
Standards Impact Map	Map that lists many impacts from standards on the basis of a classification by company function and activity. The Map also presents the priority of each impact and relates them to the three types of standards
Value	Excess in revenues over the costs to produce a product or service
Value chain	Chain of activities in an organization. A conceptual framework to analyze the internal structure of an organization by disaggregating it into core functions and relating key organizational activities to the functions. The functions are divided into primary and support functions. The functions are placed in a sequence which reflects the core operational process in an organization. Although the concept value chain has been developed originally for the analysis of for-profit-organizations, such as companies, its use can, with some adaptations, be applied to other types of organizations. The value chain concept has also been extended to cover whole supply chains and distribution networks (" industry value chain ")
Value driver	Crucial capability that gives an organization a competitive advantage
White spot	Segment in a value chain under analysis for which required data is unavailable

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ISO Central Secretariat
1, chemin de la Voie-Creuse
Case postale 56
CH - 1211 Genève 20
Switzerland
www.iso.org

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