



Economic benefitsof standards

RUB JPY INR NZD



International Organization for Standardization

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Demonstrating and Communicating the Value of Standards

Many organizations from the private and public sector use standards and participate in standards development. A few of them see standardization as directly linked to their core business strategy. Some approach standardization in a highly organized way and have a clear perception of the impact of standards on their activities and performance. Others may use standards from a narrower perspective, for specific processes or activities. Most of them realize that standards bring benefits to their organization, although the level of awareness and the perception of such benefits vary considerably.

But there are other organizations that make only marginal use of standards or that do not use them at all. Companies that consider standards a burden — something that cannot be avoided at times, but that is perceived as an additional cost or obligation with a negative impact on the company. Organizations that don't even consider participating in standards development, or that are not aware of the potential contribution that standards can bring to their activities.

One of the key aspects of the mission of national standards bodies is to liaise with organizations from all stakeholder groups to engage them in standardization and to help them get the most from standards. Being able to demonstrate the tangible benefits that standards bring to organizations – and, more generally, to citizens and society – is therefore essential.

This publication is intended precisely to assist ISO members in this task by:

- Highlighting how standards create value for the organizations that use them, and how we calculate the value of standards, and
- Providing factsheets of case studies that quantify the benefits of standards for companies of various sectors from over 20 countries.

This material can be shared with decision makers and representatives of stakeholders to outline many concrete examples of the value of standards.

The material is complemented by other information resources on the value of standards available on the ISO Website – such as vide-oclips, presentations, full versions of case studies and of the *ISO Methodology to assess the economic benefits of consensus-based standards*, the "ISO Methodology toolbox", the ISO repository of studies on the benefits of standards – which can be used by ISO members to communicate with stakeholders or to develop new studies in their countries.

The development of this impressive information resource would not have been possible without the enthusiastic contribution of so many people from the national standards bodies, the companies assessed, the university professors, students and consultants that have actively participated in the development of case studies — along with us at the ISO Central Secretariat. This is the result of a great collective effort and we wish to express our deep-felt gratitude to all those who have contributed to it.

Daniele Gerundino, *Director of Research*Reinhard Weissinger, *Senior Expert, Research and Education*Jennifer Grosfort, *Executive Assistant*Xela Damond, *Graphic Designer*



Methodology summary

Quantifyingthe **economic benefits**of **standards**

People involved in standardization are convinced that their work generates considerable benefits for organizations, markets and society. Yet substantiating and quantifying the real world value of voluntary standards is not an easy task.

This is why ISO has developed the "ISO Methodology", a consistent approach to measuring this value, which has been tested in around 30 company case studies in over 20 countries across the globe. The results speak for themselves: standards do create value for the organizations that use them and it is possible to quantify it.

The following summary describes, in a nutshell, how we quantify the economic value of applying standards.

Objectives of the ISO Methodology

The ISO Methodology aims to identify and quantify the *microeco-nomic* benefits of standards, i.e. the economic contribution the use of standards makes to company profits or the costs/revenues of an organization. All the standards assessed in this approach — whether they are international, regional or national standards, published by standards development organizations, industry groups or other consortia — are the result of an open, consensus-based process and are

made available to the public. Such standards are often called "external standards" by standards users. Company "internal" standards which are developed by the company itself and are typically not shared with other parties are not covered in this assessment.

"To be able to measure and quantify how standards have helped our organization and our customers is invaluable, enabling us to identify areas where we have done well, areas that we can further improve upon and gaps that we need to bridge."

Gerry Lee, Managing Director (Business Groups) NTUC FairPrice (Singapore)

Focusing on the value chain

The ISO Methodology is based on the Value Chain, which subdivides the operations of a company into a number of key business functions (see **Figure 1**) that, in turn, group together certain activities.

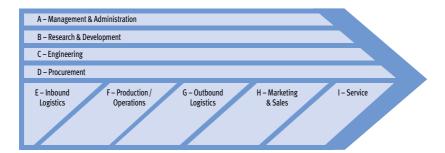


Figure 1 – Analysing the company value chain.

Steps in the assessment

A four-step approach is used to assess the impacts of standards on an organization. Since most assessments to date have been conducted on companies, we hereafter refer to "companies" (instead of "organizations").

Step 1: Understanding the value chain

The first step is to position the company within the context of the broader industry value chain.

The value chain of the company then needs to be understood in terms of its key business processes and its core value-adding activities. Defining the scope of the assessment is, at this stage, the most important decision: Should it cover the whole company? Should it be limited to one or more of its business functions? The answer will depend on the complexity of the company and on the time and resources available.

Step 2: Identifying the impacts of standards

The second step consists in determining the business functions and activities in the company value chain where standards play a significant role. Existing company documentation (e.g. the quality manual, process and organizational charts, other corporate or departmental documentation) should be used to understand the processes, business functions and main activities included in each business function. At this point, company experts are interviewed to establish which standards (or groups of standards) are applied to which activities within the selected business functions

Step 3: Analysing the value drivers and determining operational indicators

This step analyses the company value drivers (i.e. its competitive strengths) and determines the operational indicators that will be applied to measure the impacts of standards.

1. Value drivers

Value drivers are crucial organizational capabilities that give a company a competitive advantage. If the impacts of standards can be assessed in activities closely associated with value drivers, their effect on value creation may be significantly higher than for other activities (see **Figure 2**) and should be considered as the primary choice.



For example, if "low-cost manufacturing" is a company value driver, standards used in the production processes that contribute directly to this capability are likely to have greater impact. Similarly, if "innovative, superior-quality products" is a company value driver, standards used in engineering and R&D that contribute to this goal are presumed to have higher impact, and so on. In the following graphic, the intersection represents the area where standards contribute to, and sustain, value drivers and key activities.

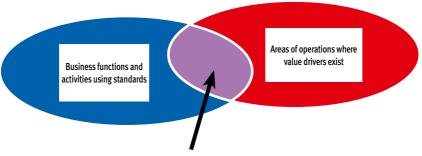


Figure 2 – Intersection: standards will generate greater benefits if they support value drivers

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.

2. Operational indicators

One or more operational indicators need to be identified in order to assess the impacts resulting from the use of standards. Operational indicators are measurable quantities associated with company activities that show improvement or degradation of performance (e.g. time and cost, number of defects, waste, sales, customer satisfaction, etc.). The operational indicators you choose must be relevant — that is, they need to capture essential aspects of the activities under analysis, for which the impacts of standards can be observed and measured. Where possible, they should be associated with the company value drivers.

Step 4: Assessing and calculating results

The purpose of the whole assessment process is to:

- Quantify the impacts of standards using the operational indicators and aggregate these impacts for each of the selected business functions
- Convert the quantities resulting from the use of standards for each of the selected business functions into financial figures
- **3.** Sum up the figures for all the selected business functions at a given point in time to determine the total contribution of standards to the company gross profit or EBIT (Earnings Before Interest and Tax) (see **Figure 3**)

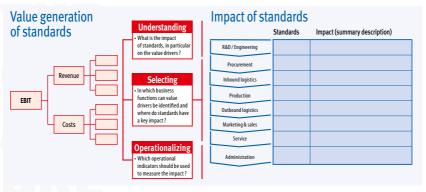


Figure 3 – Relating business functions to impacts from standards and calculating their effect on company value creation, expressed as a contribution to EBIT

"When I received the [book] *Economic benefits of standards*, I could not put it down until I had finished it. [...] Its scientific approach, applicability and credibility cannot be replaced by any other method."

Prof. Li Chuntian (China)

Successful case studies

Since 2010, ISO and its members have undertaken company case studies in more than 20 countries worldwide applying the ISO Methodology. The majority of the organizations selected are manufacturing companies, which comes as no surprise given the historical relevance of technical standards for manufacturing.

When conducting the studies, key data can be obtained through desk research and available industry data. But most of the information about the company comes from interviews and workshops with company representatives, as well as from company publications such as annual reports and other documents (e.g. manuals of quality management systems).

Methodology in action

The ISO Methodology has been tried and tested on a number of organizations. Currently, the case studies span some 15 different industries in 21 countries, covering areas such as the agri-food business, the chemical industry, construction and construction materials, electrical appliances, electrical power transmission, food retail and food logistics, heating, ventilation and air conditioning, industrial automation equipment, information and telecommunication, pipes and piping systems, shipbuilding, and water supply.

Consult our library of case studies on the ISO Website at www.iso.org/benefits_of_standards.

Compelling findings

The case studies span enterprises of varying sizes, from small companies of 25 employees with an annual sales revenue of approximately USD 4.5 million to large conglomerates of several thousand employees boasting an annual revenue exceeding USD 2.5 billion. Despite the huge disparities in size, results consistently demonstrate that companies achieve tangible benefits from using standards.

The company case studies underscore three main types of benefits from using standards:

Key benefit 1: Streamlining internal operations

One main finding is that standards can be used to streamline the internal processes of a company, for example by reducing the time needed to perform specific activities in the various business functions, decreasing waste, reducing procurement costs and increasing productivity. The case studies consistently report that the contribution of standards to the gross profit of companies ranges between 0.15% and 5% of the annual sales revenues.

Key benefit 2: Innovating and scaling up operations

Some case studies provide examples where standards served as the basis for innovating business processes, allowing companies to expand their suppliers' network or to introduce and manage new product lines effectively. In other instances, standards helped mitigate the risk to companies of introducing new products onto national markets.

Key benefit 3: Creating or entering new markets

Standards have been used as the basis for developing new products, penetrating new markets (both domestic and export), supporting the market uptake of products, and even creating markets. In exceptional cases, the impact of standards far exceeded the figure mentioned above, with companies achieving a gross profit contribution of up to 33% of their annual revenue, which helped them position themselves as leaders in their field, at least over a certain period of time.

So what does this show us? The numerous case studies carried out over the years provide substantial evidence of the benefits companies can obtain from using standards. Results of the analytical approach advocated in the ISO Methodology are convincing. The four-step assessment offers a practical tool for companies (and organizations in general) to better understand the impacts of standards on their activities and processes, and to maximize the benefits derived from them. You can find more information about the ISO Methodology in: *Economic benefits of standards. ISO Methodology 2.0*, International Organization for Standardization (2013), Geneva (downloadable at www.iso.org/benefits_of_standards).

"We were very satisfied and impressed with your ability to help us put into numbers things that we thought impossible."

Fernando Mascarenhas, Technical Documentation Coordinator, Festo Brasil (Brazil)



Fact sheets

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PT Wijaya Karya Beton

Standards achieving excellence in concrete production

PT Wijaya Karya Beton (WIKA BETON) is one of the subsidiaries of PT Wijaya Karya (Persero) – Tbk (WIKA), an Indonesian conglomerate active in the construction, industrial, mechanical, electrical, real estate and trading businesses. WIKA BETON is the Indonesian market leader in pre-cast concrete manufacturing and covers a broad product range.

Company name: PT Wijaya Karya

(WIKA) Beton

Country: Indonesia

Industry: Construction & construction materials

No. of employees: 911

Revenues/profits:

IDR 244.5 billion/IDR 17.5 billion (USD 26.9 million/USD 1.9 million) (in 2009)*

Main products/services:

Concrete structures used in construction, such as pre-stressed concrete poles for power distribution lines and PC piles, concrete open

channels, concrete railway sleepers, bridge girders, sheet piles, pipes, platform slabs and a variety of building components.

Main use of standards:

- Research and development/engineering
- · Procurement of raw materials
- · Testing of final product
- Management of operations/production
- Sales, marketing and communication with customers

Most important standards used:

ISO 9001:2008, Quality management systems





- OHSAS 18001:2007, Occupational health and safety management systems
- Various ASTM standards related to concrete and cement
- Various Japanese industrial standards (JISC) on steel and steel wires
- Indonesian national standards (SNI) on concrete
- Standards of the American Cement Institute (ACI)

Economic benefits generated by standards: IDR 1.05 billion (USD 115 000) (annually), which amounts to 0.43 % of the annual sales revenue and close to 6 % of the annual EBIT.

Key qualitative benefits: A unified management system allows for high-quality operations, resulting in increased customer confidence.

What were the major benefits for PT Wijaya Karya of using standards?

Using standards allowed PT Wijaya Karya to:

- Improve its evaluation and selection process for suppliers
- Save resources and optimize outcomes in research and development
- Optimize information transfer through unified specifications and harmonized information capture
- Ensure high-quality supplies
- Optimize production processes
- Obtain benefits in sales negotiations by reference to standards, and avoid misunderstandings

These benefits translated into an annual contribution of approximately IDR 1.05 billion (USD 115 000) to company gross profits.

How did standards lead to these benefits?

Under a unified quality management system based on ISO 9001, the operations of different business functions were integrated and optimized. Particularly relevant are the time savings in the engineering business function due to the dissemination of standardized information (e.g. for material specifications, process specifications and standardization of the product). This information is also used to define better working instructions and operational procedures, leading to the increased efficiency of several production processes. Such developments have also helped to achieve higher product quality, boosting both customer confidence and sales revenues.



Standards driving process improvement

NTUC FairPrice is the largest supermarket chain in Singapore with a market share of over 50 %. It was founded in 1973 by the labour movement with a social mission to moderate the cost of living in Singapore. At the time of the study, it had over 240 retail outlets.

Company name: NTUC FairPrice

Country: Singapore

Industry: Food retail/food logistics

No. of employees: Over 7 000

Revenues/profits: SGD 2 billion/ over SGD 120 million (USD 1.4 billion/

USD 85.3 million) (in 2010)*

Main products/services:

All types of foods

The assessment focused in particular on the processing of:

- · Frozen pork
- Milk and dairy products
- Fresh vegetables

Main use of standards:

- Procurement
- Storage (including an automated sorting system) and transport
- Delivery to, and support of, retail outlets

Most important standards used:

- SS CP 95:2002, Cold chain management Milk and dairy products
- SS CP 552:2009, Cold chain management Chilled pork
- ISO 6780:2003 and SS 334:2010, Flat pallet for material handling
- EAN 13; ISO/IEC 16390:2007; ITF-14 etc., *Bar-code standards* NTUC is certified against HACCP and ISO 9001.

Economic benefits generated by standards:

SGD 4.5 million (USD 3.2 million) annually





Key qualitative benefits: Nurturing a culture of continuous improvement.

What were the major benefits for NTUC of using standards?

Using standards allowed NTUC to:

- Double the volume of goods handled while retaining the number of employees, leading to a revenue increase
- Improve process efficiency
- Extend the supplier network
- · Raise and maintain the level of product quality
- Increase the level of customer confidence and loyalty

These benefits translated into annual savings of approximately SGD 4.5 million (USD 3.2 million) in addition to nurturing a culture of continuous improvement in the company.

How did standards lead to these benefits?

The main classes of standards investigated in this study were pallet standards, barcode standards and cold chain standards for chilled pork, milk and dairy products. Standardized pallets helped the company systemize their handling of goods, making optimal use of storage and warehouse space, reducing delivery costs and facilitating the automation of warehouse operations.

In addition, standardized carton bar codes, which were introduced in 2000, helped improve operational efficiency, the accuracy of information and the delivery of products from their distribution centres. Before the use of carton bar codes, the company manually recorded product information, which was both time-consuming and a source of error. These measures meant the company could handle more goods (leading to a doubling of the number of retail outlets and growing sales of fresh fruit) without significantly increasing its manpower.

The use of cold chain standards for both pork and milk and dairy products helped the company to ensure the proper management of pork, milk and dairy products during production, storage, transportation, manufacturing, distribution, handling and at the point of sale. This guaranteed good product quality, decreased wastage, enhanced customer confidence, and gave NTUC FairPrice the possibility to sell higher-value goods, thus increasing revenue further.

^{*} SGD 1 = USD 0.71153 (2009-12-31)



Standards ensuring stable and reliable operations

PTT Chemical Public Company Limited (PTTCH) is a leading petrochemical company in Thailand. It operates broadly across the chemical sector and its main products are olefins and derivatives, polymers and ethylene oxide-based performance products.

PTTCH manufactures polyethylene for the Thai process industry, which produces equipment and plastic resins used in daily life. PTTCH has therefore contributed to reducing the imports of plastic resins, supporting the development of the national economy.

Company name: PTT Chemical Public

Country: Thailand

Industry: Chemical industry

No. of employees: 1360

Revenues/profits:

THB 103.2 billion/THB 10.7 billion (USD 3.1 billion/USD 321 million) (for total PTTCH) (in 2010)*

Main products/services:

Various chemical products (olefins, polymer products, EO-based products, oleochemical products, ethylene, propylene, etc.).

The assessment focused on high-density

polyethylene (HDPE) and, in particular, on the activity of one of PTTCH's most important factories (named HDPE I-1), which uses process technology licensed from Mitsui Chemical Inc., Japan.

Main use of standards:

- Production/operations
- Engineering



Most important standards used:

- ISO 9001:2000, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS/TIS 18001:1999, Occupational health and safety management systems
- ISO/IEC 17025:2005, Requirements for the competence of testing and calibrating laboratories
- Various technical standards related to testing and product characteristics (JIS, ASTM and others)

Economic benefits generated by standards: USD 9.4 million annually, which amounts to approximately 3 % of the annual sales revenue attributable to the HDPE I-1 plant.

Key qualitative benefits: The combined effect of management system standards and product/testing standards brought a steady increase to the plant's output. The specific impact of ISO/IEC 17025 certification for the PTTCH testing service centre could not be quantified. However, it contributed significantly to ensuring the effectiveness and consistency of laboratory tests for raw materials and the finished products.

What were the major benefits for PTTCH of using standards?

Using standards allowed PTTCH to operate the plant in a stable and consistent way, enabling it to reach its maximum level of output.

How did standards lead to these benefits?

The ISO 9001 quality management system played a key role in defining fundamental guidelines for good manufacturing practice, supporting the introduction of measures with a quantifiable impact on the four key indicators used by PTTCH to assess the performance of its production processes: plant reliability (deviation from optimal production capacity), off specification (percentage of product not conforming to specification), ethylene consumption (percentage of final product) and energy index (usage of energy per ton of product).

Other standards (e.g. for testing and product characteristics) were integrated into the overall management system, and the benefits derived from using standards were assessed on the basis of their impact on the four key indicators.



Standards improving business processes and quality

Established in 1967, VINAKIP is a subsidiary of the Vietnam Electrical Equipment Corporation, a joint public company of which 36.03% are owned by the Ministry of Industry and Trade and 63.97% by private shareholders.

GBP

Company name: Electrical Devices Joint Stock Company No. 1 (VINAKIP)

Country: Vietnam

Industry: Electrical appliances

No. of employees: 540

Revenues/profits: VND 196 billion/ N.A. (USD 9.8 million/N.A.)(in 2010)*

Main products/services:

Sockets, wires and cables, electromagnetic ballasts, plugs, switches, lamp holders, electrical boards, circuit-breakers, magnetic contactors, and fuses.

The assessment concentrated on two types of products: sockets, and wires and cables

Main use of standards:

- Procurement, including testing of incoming materials
- Production
- Research and development
- · Marketing and sales

Most important standards used:

- TCVN ISO 9001:2008, Quality management systems
- Many national product and testing standards (TCVN), most of them adoptions of ISO or IEC standards





Economic benefits generated by standards: VND 7.49 billion (USD 370 500) which amounts to 3.8% of the annual sales revenues.

Key qualitative benefits: Standards helped develop a culture of continuous improvement.

What were the major benefits for VINAKIP of using standards?

Using standards allowed VINAKIP to:

- Reduce product lines to a limited number of standardized products
- Improve control over materials provided by suppliers, thereby ensuring the quality of supplies
- Simplify supplier management by insisting on the use of standards
- Share information efficiently between internal departments
- Reduce production costs and limit the generation of waste
- Improve training of staff by referencing standards
- Unify documentation, packaging and labelling practices for most of its products
- Instil a culture of continuous improvement in the company

How did standards lead to these benefits?

The quality management system based on ISO 9001 helped VINAKIP define its business processes clearly and share information regarding product characteristics, key activities, performance indicators and good practice. This resulted in the overall improvement of processes, a reduction in product variety and better cooperation with suppliers, leading to higher-quality inputs, less waste and a lower number of repairs.

The extensive use of product and testing standards allowed VINAKIP to meet customer expectations and legal requirements, while the ISO 9001 certification strengthened the company's reputation and customers' confidence in its products.



Festo Brasil

Standards sustaining engineering and manufacturing excellence

Festo Brasil is the Brazilian subsidiary of the German company Festo, a world-leading provider of pneumatic and electric drive technology, integrated systems, and services for factory and process automation. Festo Brasil is one of the group's largest companies and manufactures a wide variety of products for the Brazilian market and for export to other Festo subsidiaries and to the parent company.

Company name: Festo Brasil

Country: Brazil

Industry: Industrial automation

equipment

No. of employees: 503

Revenues/profits:

BRL 239 million/N.A. (USD 143 million/N.A.) (in 2010)*

Main products/services:

Over 40 000 products, from valves to complex industrial automation equipment, used in all important sectors of industry: automotive, food, packaging, plastics, electronics, etc.

Main use of standards:

- Engineering
- Procurement
- Production

Most important standards used:

- ISO 9001:2000, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems





- ISO/TS 16949, Application of ISO 9001 to the automotive industry
- VDA 6.4, Quality management system for equipment suppliers in the automotive industry
- Many other materials, testing, product and design standards developed by ISO, DIN, EN, SAE, UL, AISI and others

Economic benefits generated by standards: BRL 4.5 million (USD 2.7 million) annually, which amounts to 1.9 % of sales revenues.

Key qualitative benefits: Standards are considered an essential component of good engineering and manufacturing practices, with a potential that has not yet been fully exploited.

What were the major benefits for Festo Brasil of using standards?

Using standards allowed Festo Brasil to:

- Implement an efficient procurement process resulting in significant work savings
- Save around 30% in its purchase operations by buying standardized supplies
- Optimize the design times of its engineers and shorten time to market
- Improve communication between different technical departments in the company
- Implement a company-wide continual improvement process that streamlined manufacturing and brought significant savings

How did standards lead to these benefits?

As an innovative company with a focus on high-quality sophisticated equipment and the ability to customize equipment to user needs, Festo Brasil uses standards in all its key business processes. Using standards in procurement and focusing on the purchase of standards-based parts saved around 30% in costs. Procurement, which makes up around 80% of the quantitative gains, is the function which benefitted most from standards. Due to clever use of advanced standards, the design time of engineers, as well as the overall project time, could be reduced, allowing new or customized products to reach the market within a shorter time frame than otherwise possible.

A thorough implementation of ISO 9001, combined with organizational, managerial and technical improvements, was the driver behind the increased quality and productivity in manufacturing, allowing Festo Brasil to become a world-class producer for a significant part of Festo's global portfolio.



Standards creating competitive advantage

Gerfor is a Colombian multinational company active in the plastics and synthetic fibres sector of the petrochemical industry. It is one of the leading South American companies in the production and commercialization of faucets and PVC and CPVC piping and fittings.

Company name: Gerfor

Country: Colombia

Industry: Faucets, pipes and piping systems

No. of employees: 850

Revenues/profits: USD 104.5 million/

USD 104.5 million/ USD 14.3 million (in 2010)

Main products/services:

PVC and CPVC pipes and fittings for the construction and sewerage industries, tiles, PVC covers, household faucets, solvent cement.

Main use of standards:

- Continual improvement in production and operations
- Market access (marketing and sales)
- · Design of new products
- Quality inspections of supplies



Colombia corre por nuestras venas



Most important standards used: Over 200 standards are used: national standards of Colombia (NTC), standards of ISO, ASTM, ASME, European standards, etc.

Economic benefits generated by standards: USD 8 051 919 annually, which amounts to 7.7% of the company revenues.

Key qualitative benefits: In addition to the quantified impacts, benefits to research and development and to engineering are also deemed substantial.

What were the major benefits for Gerfor of using standards?

Using standards allowed Gerfor to:

- Expand rapidly on the domestic market, meeting and driving demand for quality products
- Access international markets by fulfilling market entry conditions
- Optimize internal operations
- Ensure the quality of supplies

How did standards lead to these benefits?

Gerfor is a serious implementer of product and testing standards and contributes to their development through active participation in standardization committees at the national and international levels.

The company has helped promote quality in Colombia through the development of standards for PVC pipes and other products. Compliance with such standards has gradually emerged as an essential requirement for most high-volume projects (both in the private and public sectors). This resulted in a significant competitive advantage for all companies able to master product quality and demonstrate compliance. (All Gerfor products are designed and certified in conformity with Colombian standards.)

Gerfor is now turning its attention to the international market in order to meet existing and emerging product and testing requirements in foreign countries.

Gerfor has also been very active in implementing management standards, introducing the ISO 9001, ISO 14001 and OHSAS 18001 management systems, which have helped streamline its processes and increase quality and reliability.



Founded in 1994, Danper is one of the largest agro-exporter companies in Peru, boasting total revenues of USD 88 million in 2010, derived almost entirely from export (to the USA, Europe and other markets). Asparagus (white and green) and artichokes are by far the most important specialities produced by Danper and its business comprises three major lines: preserved goods (about 77% of sales), fresh products (21% of sales) and frozen products (2% of sales).

Company name: Danper Trujillo

Country: Peru

Industry: Agri-food business

No. of employees: 6000

Revenues/profits:

USD 88 million/N.A. (in 2010)

Main products/services:

Asparagus (white and green), artichokes, peppers, beans, mangoes, papayas – preserved, fresh and frozen vegetables and fruits. Assessment was restricted to the asparagus business line.

Main use of standards:

- Harvesting (production)
- Sampling
- Storage
- Marketing and sales
- Delivery/transport

Most important standards used:

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, *Environmental management systems* National Peruvian standards (NTP) on asparagus, such as:





- NTP 011.109 (2008), ASPARAGUS Asparagus fresh Requirements
- NTP 011.116 (1991), ASPARAGUS Refrigerated transportation guide
- NTP 209.401(2001), ASPARAGUS Hygienic practices for processing of fresh asparagus
- OHSAS 18001:2007, Occupational health and safety management systems
- HACCP (FAO/Codex Alimentarius)
- SA 8000, Social accountability
- GlobalGap (version 03) and US GAP (version 08.06), Safe and sanitary agriculture
- BASC 03-2008, Business Alliance for Secure Commerce
- Regulations from various countries and regions (Peru, EU, UK)

Economic benefits generated by standards: USD 648158 annually which amounts to 0.73% of sales revenue.

Key qualitative benefits: Standards helped instil a culture of continuous improvement in the company.

What were the major benefits for Danper of using standards?

Using standards (and certifications) allowed Danper to:

- Continually improve its skills and implement an efficient and reliable production chain
- Manage a highly efficient cold chain and delivery service for fresh produce, ensuring product quality requirements in overseas markets are met
- Demonstrate to overseas customers its ability to produce and deliver safe, high-quality products and qualify as a supplier for them
- Export close to 100% of its produce and penetrate new markets by meeting the requirements and building the confidence of key international retailers

How did standards lead to these benefits?

Danper considers the use of standards – and the proactive implementation of new standards – essential to improving production, procurement, farming and logistical processes. But most importantly, demonstrating compliance with standards and achieving certification has been invaluable to establishing Danpers' credibility and reputation on the international market. Such qualifications are a good complement to Danper's flexibility, its approach to product innovation and its responsiveness to customer demand. All the company managers interviewed underlined the essential role of standards and certification in accessing export markets.



Lobatse Clay Works

Standards creating process efficiencies

Lobatse Clay Works (LCW) began operating in 1992 as a joint venture between the Botswana Development Corporation (BDC) and an American company, Inter-Kiln. In 2004, Inter-Kiln diversified and BDC gained total ownership of LCW. The company produces mainly face bricks, but also window sills and pavers, which are categorized as special bricks. LCW boasts an output of over 30 million items per year and has been a major partner in building Botswana's infrastructure.

Company name: Lobatse Clay Works

(PTY) Ltd. (LCW)

Country: Botswana

Industry: Construction and construction materials

No. of employees: 175

Revenues/profits:

BWP 64 million/BWP 34 million (USD 9.73 million/USD 4.6 million) (in 2010)*

Main products/services:

Bricks (face bricks, pavers, window sills)

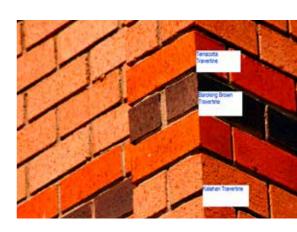
Main use of standards:

Standards were used extensively in production, the business function covered by the assessment.

Most important standards used:

- BOS 28, Burnt clay masonry units (based on South African national standard SANS 227), which defines requirements for product characteristics and test methods
- BOS ISO 9001, Quality management systems
- BOS OHSAS 18001, *Occupational health and safety management systems* (At the time of the assessment, LCW was preparing for ISO 9001 certification)





Economic benefits generated by standards: BWP 1 685 289 (USD 256 213) annually, corresponding to 2.63 % of company sales revenue or 4.96 % of company EBIT (in 2010).

Key qualitative benefits: The reduction in number of products bolstered efficiency; communication within the LCW production unit was made easier and the training of staff was improved by referring to standards.

What were the major benefits for LCW of using standards?

Using standards allowed LCW to:

- Calibrate its equipment and keep it in good working order
- Increase the conformance rate of raw materials received from suppliers
- Improve the production process, minimizing product failures
- Reduce the number of incidents causing health and safety issues

How did standards lead to these benefits?

Standards have helped LCW to focus its operations on a limited number of brick types, which it produces to a consistently high quality. Quality procedures defining its processes, from the excavation of clay soil to the production of the final bricks and their packaging, storage and delivery to customers, have helped the company streamline its production processes and optimize production runs with fixed settings of the equipment. Adherence to BOS 28, which defines specifications for different types of bricks, has been key to ensuring consistent quality.

^{*} BWP 1 = USD 0.15203 (2010-12-31)



PPC Cement

Standards sustaining company reputation through quality

Pretoria Portland Cement Company (PPC) was established in 1892 when the first cement plant was developed in South Africa to counter the high cost of cement imported from Europe. Today, PPC is the leading supplier of cement in Southern Africa. In its eight cement manufacturing facilities and three milling depots in South Africa, Botswana and Zimbabwe, the company can produce around eight million tons of cement products each year. PPC also produces aggregates, metallurgical-grade lime, burnt dolomite and limestone through the controlled companies PPC-Aggregate Quarries Pty and PPC-Lime.

Company name: Pretoria

Portland Cement Company Limited

(PPC Cement)

Country: South Africa

Industry: Construction and construction materials

No. of employees: Around 3200

Revenues/profits:

ZAR 5.9 billion/N.A. (USD 795 million/N.A.) (in 2009)*

Main products/services:

Different types of cement for generalpurpose and specialist use

Main use of standards:

The assessment focused on the business functions that make the most use of standards:

- Research and development (R&D)
- Procurement
- Production
- Marketing and sales







Most important standards used:

- SANS 50197, Composition and specification of cement
- SANS 50196, Methods of testing cement
- SANS 9001:2008, Quality management systems
- SANS 14001:2004, Environmental management systems
- SANS 18001:2007, Occupational health and safety management systems
- SANS 17025, Requirements for the competence of testing and calibration laboratories
- SANS 1841, Requirement for the content of packages

Economic benefits generated by standards: ZAR 147.5 million (USD 19.8 million) annually, which amounts to 2.5% of the company's sales revenue.

Key qualitative benefits: A dynamic quality culture was embedded throughout the company.

What were the major benefits for PPC Cement of using standards?

Using standards allowed PPC Cement to:

- Increase workforce competence
- Reduce waste, energy consumption, emissions and product defects
- Streamline production processes and lower production costs
- Reduce the number of incidents causing health and safety issues
- Improve risk management in its operations
- Win contracts and expand markets by meeting product requirements, having previously obtained certifications

How did standards lead to these benefits?

Standards are used by the R&D unit to ensure that manufacturing processes are compatible with, and regularly upgraded to, new technology, driving a more efficient manufacturing process.

Standards had a positive impact on staff development, reducing the time allocated to training and encouraging staff to use standards throughout their operations as a common tool. They also helped reduce the time needed to finalize agreements and contracts with customers and suppliers.

Ultimately, standards afforded a boost to sales as standardized products of consistently reliable quality increase customer confidence.



Standards sustaining product innovation

The global company known today as Siemens AG was founded in 1847 as the Telegraph Construction Company of Siemens & Halske in Berlin, Germany. The company subsequently became a world leader in the field of electrotechnology and further diversified into medical devices and household appliances.

Today, Siemens AG is divided into three sectors: industry, healthcare and energy. Siemens Energy is a world market leader in the development and provision of energy plants for power generation, transmission and distribution.

The assessment focused on switch technologies, a line of business belonging to the Siemens Energy branch.

Company name: Siemens AG Switch technology sector

Country: Germany

Industry: Electrical power transmission

No. of employees: Total employees

of Siemens AG: 405 000

Revenues/profits:

Total revenue of Siemens AG: EUR 75.98 billion/net profit EUR 4 billion (USD 100.68 billion/net profit USD 5.3 billion) (in 2010)*

Main products/services:

Power switches and switchgear. These

include high-voltage switches used predominantly in power transmission and mid-voltage switches for power distribution. The portfolio of Siemens switches includes outdoor and indoor switchgear, air- and gas-insulated switchgear, as well as circuit-breakers, current disconnectors and earthing switches.

Main use of standards:

Design, production and sale of power switches



Most important standards used: Siemens has a long history of using standards and a broad experience with standardization. All of Siemens' switchgear devices meet or exceed existing standards (primarily DIN EN standards) and are known on the market for their high level of safety, reliability and durability. For this reason, the assessment focused on the incremental benefits to Siemens arising from its migration to the latest edition of a particular series of standards, the DIN EN 62271 series on high-voltage switchgear and controlgear.

Economic benefits generated by standards: Between 1.1 % to 2.8 % of the EBIT of the relevant business units in Siemens.

Key qualitative benefits: Standards brought a notable change in management culture.

What were the major benefits for Siemens of using standards?

Using standards allowed Siemens to:

- Become aware of changes to procedures for developing and approving switches
- Implement changes to technical requirements for switches and switchgear
- Embrace quality and service requirements
- Adopt changes to recommended and mandatory values, in particular those relevant to tendering
- Take early steps to implement the standards in cost-effective ways and thereby acquire a leadership position over its competitors

How did standards lead to these benefits?

Through active participation in standards development, Siemens is able to influence their content and remains informed of any upcoming changes in new editions. The company is therefore in a position to take early measures to accommodate the changes and find cost-effective ways of implementing them in its products. By implementing the new edition of the DIN EN 62271 series early, Siemens was able to make savings and generate profits, in particular when its competitors struggled with the transition to the new standards.

^{*} EUR 1 = USD 1.32515 (2010-12-31)



Standards creating competitive advantage

Nanotron is a small-sized engineering company founded in Berlin, Germany, in 1991 and active in the global information and communication technology (ICT) sector. With the support of venture capital, Nanotron started up its own technology development in 2001 and was able to build a patented technology based on CSS (Chirp Spread Spectrum), a spread-spectrum technique that uses wideband linear frequency modulated chirp pulses to encode information. Its first product, the nanometer, was introduced in 2004 to enable the implementation of wireless networks.

Company name: Nanotron

Technologies GmbH

Country: Germany

Industry: Information and telecommunication

No. of employees: 25

Revenues/profits:

USD 4.5 million/N.A. (in 2010)

Main products/services:

Nanotron's current product portfolio focuses on physical position localization: wireless products that help to protect and find people, animals and valuable assets by transmitting information about their location.

Main use of standards:

- Product design
- · Marketing and sales

Most important standards used:

• ISO/IEC 24730, Real-time locating systems





- IEEE 802.15.4, Low-rate wireless personal area networks
- DIN EN ISO 9001, Quality management systems

Economic benefits generated by standards: USD 1.48 million (close to 33% of sales revenue in 2010).

Key qualitative benefits: Involvement in standards development and early adoption of standards established the company's technology leadership within its field.

What were the major benefits for Nanotron of using standards?

Using standards allowed Nanotron to:

- Become an industry leader for remote sensing and real-time location devices
- Specify product requirements precisely on the basis of standards
- Increase customer confidence in Nanotron products by basing them on standards
- Reduce product development costs
- Increase the accuracy of product descriptions and technical documentation
- Optimize company internal processes

How did standards lead to these benefits?

By engaging in standards development, Nanotron was able to contribute its technology, including patents, to standardization and, hence, shape the content of future standards. At the same time, it was able to bring its internal developments in line with the development of new standards.

A portfolio of products based on International Standards enables Nanotron — which is a small company — to reassure potential customers as to the long-term reliability of its technologies and generate the confidence to invest in its products.

Nanotron was able to exploit its technical leadership image and the network of relations it had developed through its standardization work by establishing commercial relations and licensing its technology to large multinational companies.



Standards sustaining innovation and creating market leadership

PPP PSL is part of the Desbro Group of Companies, a conglomerate active in manufacturing and trading activities in a variety of sectors in Mauritius, Reunion, Madagascar, South Africa, Kenya, Uganda, Tanzania, the Seychelles and the United Arab Emirates.

PPP PSL manufactures plastic pipes and fittings made of PVC-U in sizes ranging from 20 mm to 250 mm. PPP PSL also manufactures polypropylene (PP) single-wall corrugated pipes in small sizes for electrical conduit applications, and has a subsidiary company involved in the manufacture of polyethylene (PE) pipes.

Company name: Plastic Pipes and Products Piping Systems

(PPP PSL) Ltd.

Country: Mauritius

Industry: Pipes and piping systems

No. of employees: 140

Revenues/profits:

MUR 241.3 million/MUR 24.1 million (USD 8 million/USD 800 000)

(in 2011)*

Main products/services:

Plastic pipes and fittings for water supply, sewerage, drainage and conduits for electric wires. Doublewall pipes for telecommunication and sewerage applications.

Main use of standards:

- Procurement, including the testing of raw materials
- Production and process monitoring
- Final inspection





Most important standards used:

Various standards with specifications for products and testing methods, such as:

- ISO 1452, Plastics piping systems for water supply and drainage
- ISO 3633, Plastics piping systems for soil and discharge
- ISO 4435 and EN 13476, *Plastics piping systems for underground drainage* and sewerage
- ISO 9001, Quality management systems
- Other standards on product and testing requirements

Economic benefits generated by standards: MUR 5.4 million (USD 177700) without structured wall pipes and MUR 11.1 million (USD 364300) including structured wall pipes. The first figure amounts to 4.5% of revenues, the latter to 9.2%.

Key qualitative benefits: Standards allowed PPP PSL to be continuously innovative and a leader in its domestic market.

What were the major benefits for PPP PSL of using standards?

Using standards allowed PPP PSL to:

- Reduce costs by reducing waste and the number of rejected products and reworks
- Use energy efficiently and apply efficient procurement practices
- Operate a highly reliable production chain

How did standards lead to these benefits?

PPP PSL uses standards systematically in order to reach a stable production process and to save materials by reducing waste as well as other resource, such as energy. These savings contribute to rises in gross profit.

As the first company in its field in Mauritius, PPP PSL applied a European standard for structured wall pipes which allowed it to manufacture pipes with a double-wall structure that saves on materials while maintaining the same level of performance and reliability as traditional pipes. Using standards has enabled PPP PSL to successfully undergo testing and gain quality marks for its products, which in turn contribute to its strong market position. This has become increasingly important in Mauritius where the market is becoming highly competitive, particularly due to low-cost imports from East Asia. PPP PSL is an active participant in standards committees in Mauritius. This enables it to influence the development and adoption of new standards while keeping abreast of developments in standardization on the international scene.

^{*} MUR 1 = USD 0.03273 (2011-12-31)



Standards ensuring food safety and supporting high-quality automated production

Juhayna Food Industries is a leading Egypt-based manufacturer specializing in the production, processing and packaging of milk, yoghurt, juice and juice concentrate. When Juhayna's founder, Safwan Thabet, established the company in 1983, he had the vision to produce dairy and juice products of the highest quality by applying the most up-to-date technology. The company has continued to reinvent itself ever since in response to both global trends and local market needs, becoming a leader in the Egyptian market and a significant regional exporter.

Company name: Juhayna Food

Industries S.A.E.

Country: Egypt

Industry: Agri-food business

No. of employees: 3860

Revenues/profits: EGP 2 billion/N.A. (USD 285 million/N.A.) (average annual revenue 2009 to 2012)*

Main products/services:

Milk, fruit juice and yoghurt products. The assessment focused on the production of packaged fruit juices.

Main use of standards:

- Procurement (supply chain)
- Testing of supplies (supply chain)
- Manufacturing
- Distribution

- ISO 9001:2008, Quality management systems
- ISO 22000:2005, Food safety management systems





- Good Manufacturing Practices (EU and US Guidelines)
- ISO 17025:2005, Requirements for the competence of testing and calibration laboratories
- OHSAS 18001:2007, Occupational health and safety management systems
- HACCP (FAO/Codex Alimentarius)
- Many Egyptian national standards, mainly for product and labelling requirements

Economic benefits generated by standards: EGP 66.7 million annually (USD 12 million in 2010), which amounts to 3.3% of the annual average revenue.

Key qualitative benefits: Implementing standards has fostered consistently high product quality, and heightened environmental performance and cost reductions due to savings in materials. Training suppliers has helped improve their performance.

What were the major benefits for Juhayna of using standards?

Using standards allowed Juhayna to implement a highly effective management system and specific functional improvements to:

- Enhance communication with suppliers
- Apply an automated system minimizing human error
- Reduce costs for re-work and replacement as a consequence of deficient quality
- Ensure product safety
- Achieve high-volume production and improve efficiency
- Reduce waste and scrap and improve environmental performance
- Increase market share

How did standards lead to these benefits?

The company's juice products are manufactured at its new state-of-the-art El-Dawleya factory. This facility, designed and built to international food and hygiene standards, implements a fully automated process that controls the reception of raw materials, as well as the mixing process, package filling and palletizing of the final product via computerized systems.

Management, product and testing standards provide a solid framework, straightforward objectives and clear criteria. In addition, they support documentation, exchange of information and transfer of knowledge and create a basis on which to set performance indicators, elements that are indispensable for running Juhayna's fully automated processes and meeting quality and safety requirements.

^{*} EGP 1 = USD 0.18116 (2009-12-31)



Standards as a basis for building international competitiveness

Petra Engineering Industries Co. is a leading engineering company in the heating, ventilation and air-conditioning (HVAC) industry in Jordan. Founded in 1987 with a vision to produce a wide range of equipment meeting the requirements of major markets, the company has expanded significantly. Today, about 75 % of its total sales derive from exports, primarily to the Middle East, but also to the USA and other countries.

Company name: Petra Engineering

Industries Co.

Country: Jordan

Industry: Heating, ventilation, air conditioning (HVAC)

No. of employees: Over 1500

(in 2011)

Revenues/profits: N.A.

Main products/services:

Wide portfolio of heating, ventilation and air-conditioning products

Main use of standards:

- Research and development
- Procurement
- Production, quality assurance
- Marketing and sales

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- AHRI (Air-Conditioning, Heating and Refrigeration Institute) standards, in particular AHRI 260, AHRI 350, AHRI 430 and AHRI 440
- ANSI/ASHRAE standards mainly for testing methods





- Various European standards (EN) mainly for testing methods
- UL standards for heating and cooling equipment

Economic benefits generated by standards: 4.2 % of Petra's average sales revenues between 2006 and 2010.

Key qualitative benefits: Improved environmental and safety management strengthened the company's reputation, while efficient service enhanced customer satisfaction.

What were the major benefits for Petra of using standards?

Using standards allowed Petra to:

- Save on the cost of testing inputs by purchasing from certified suppliers
- Achieve higher reliability/quality of supplies by using standardized components

High-quality, reliable materials and parts are a pre-condition for Petra's manufacturing excellence and reputation.

How did standards lead to these benefits?

Standards were used systematically in the first instance to evaluate the quality of supplies. On that basis, Petra was able to switch to purchasing inputs from certified suppliers only.

With the help of the ISO 9001 quality management system, Petra was able to ensure tight control over its production processes, helping to build up its reputation as a high-quality producer. The company was also successful in obtaining various internationally recognized certifications. Standards and certification marks feature prominently in Petra's product catalogues, highlighting the importance the company attributes to standards as a means of forging an international reputation and entering foreign markets.



Holcim Lebanon

Standards for risk reduction and market acceptance

Holcim Lebanon S.A.L. (HL) was incorporated in Lebanon in 1929 as a subsidiary of the Switzerland-based Holcim Ltd., one of the largest cement producers in the world. The company produces and markets grey and white cement and other related concrete construction products. It focuses on offering high-quality products and enhancing its image to customers as an environmentally responsible organization. HL is the leading cement producer in Lebanon.

Company name: Holcim

Lebanon S.A.L.

Country: Lebanon

Industry: Construction and construction materials

No. of employees: Around 300

Revenues/profits:

Average 2002-2010:

USD 131.7 million/USD 48.2 million

Main products/services:

Wide portfolio of cement products

Main use of standards:

Manufacturing of cement

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- NL 53:1999, Cements Portland cement types (Lebanese national standard)
- European standards (EN) on cement composition and testing
- Some ASTM standards on cement.





Economic benefits generated by standards: USD 1.1 million annually (for the period 2001–2011), which represent 0.84% of the annual revenues and 2.3% of the EBIT.

Key qualitative benefits: Standards helped Holcim nurture a culture of environmental and social responsibility, which drives to responsible production in its industry in Lebanon.

What were the major benefits for Holcim Lebanon of using standards?

Using standards allowed Holcim Lebanon to:

- Ensure consistent levels of quality, performance and environmental impact for the various companies belonging to the Holcim Group
- Promote the acceptance of products with a lower clinker factor on the Lebanese market. Reducing the amount of clinker lowers production costs and improves environmental performance (through decreased CO₂ emissions during the production process). Holcim Lebanon mastered the technology for producing cement with a lower clinker factor and was able to profit from increased market acceptance of these types of cement

How did standards lead to these benefits?

National and international technical and management standards are integrated into an extensive company-internal system of procedures, methods and requirements that are mandatory for all companies of the Holcim Group. Their implementation supports the overall performance of the Group.

Lebanese standard NL 53 played a key role in driving market acceptance for cement with a lower clinker factor rather than the traditional Portland cement that dominated the Lebanese market until the late 1990s and beyond. The chief contribution of this standard, derived from European standard EN 197, was to assure market players of the performance and reliability of these types of cement.

For Holcim Lebanon, it mitigated the risk of introducing this cement onto the Lebanese market and helped convince customers of its fitness for purpose.



MAGA Engineering

Standards as a means to capture and transfer know-how

MAGA started as a construction company in 1984, working with several international contractors executing projects in Sri Lanka. Since then, the company has made significant inroads into the local and international construction industry, and has won the most prestigious quality awards issued by the Institute for Construction Training and Development (ICTAD) of Sri Lanka.

Company name: MAGA Engineering

(Pvt) Ltd.

Country: Sri Lanka

Industry: Construction and construction materials

No. of employees: 9161

(of which 6691 are direct employees)

Revenues/profits:

LKR 11.6 billion (USD 101.9 million) Revenues from building construction: LKR 3.17 billion (USD 27.8 million) (in 2011)*

Main products/services:

- Wide portfolio of large-scale residential and office buildings, hospitals, etc.
- Infrastructure constructions (e.g. bridges, highways)

The study focused on the building construction sector and excluded infrastructure projects (such as bridges or highways).

Main use of standards:

- · Procurement, including testing of supplies
- Production





Most important standards used:

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems
- Many Sri Lankan national standards, mainly on construction materials

Economic benefits generated by standards: LKR 17145 720 (USD 150 367), corresponding to 0.54% of the average annual revenue.

Key qualitative benefits: The purchasing process, supplier evaluation and storage management have become more efficient with the ISO 9001 system in place.

What were the major benefits for MAGA of using standards?

Using standards allowed MAGA to:

- Increase its efficiency in purchasing from suppliers
- Test whether supplies meet requirements and thereby ensure quality
- Improve consistency in supplier evaluation and selection
- Increase construction quality and reduce need for re-work

How did standards lead to these benefits?

The ISO 9001-based quality management system enabled MAGA to develop an integrated approach to managing its key processes, and transfer experiences and good practices systematically from one project to another. This helped increase efficiency, create a wealth of experience and promote continuous learning and improvement within the company.

^{*} LKR 1 = USD 0.00877 (2011-12-31)



Dalian Shipbuilding

Standards as a tool for innovation and legal compliance

The Dalian Shipbuilding Industry Company, located in the city of Dalian, Liaoning Province, China, is the largest shipbuilding enterprise in China. It is part of the China Shipbuilding Industry Corporation (CSIC), one of the two state-owned shipbuilding corporations in China. A flagship of China's shipbuilding industry, the Dalian Shipbuilding Industry Corporation (hereinafter referred to as DSIC) is a modern engineering and final assembly company spanning five industries — shipbuilding, defence, ocean engineering, ship repair (including shipbreaking) and heavy industrial manufacturing (e.g. equipment for offshore plants).

Company name: Dalian Shipbuilding

Industry Co. Ltd. (DISC)

Country: China

Industry: Shipbuilding

No. of employees: DISC total: 7 600 Research&development (R&D): 867

Revenues/profits: From R&D:

CNY 150.8 million/N.A. (USD 22.7 million/N.A.) Total revenue of DISC:

CNY 22.7 billion (USD 3.4 billion)

(in 2010)*

Main products/services:

The assessment focused on the R&D business function of DSIC's shipbuilding branch. The products of the shipbuilding branch are divided into oil tankers, bulk carriers, container ships and special ships.

Main use of standards: The shipbuilding industry uses a variety of technologies and its processes are very complex, requiring a large number of standards (over 100 000 Chinese, international and other standards). The most important ones for R&D are product and testing standards used for the design of whole ships, their subsystems and parts.





Most important standards used:

- Conventions of the International Maritime Organization (IMO)
- Chinese national standards
- Chinese industry-sector standards for the shipbuilding industry
- Some ISO standards (ISO 9001, ISO 14001 and standards of ISO/TC 8)
- OHSAS 18001:2007, Occupational health and safety management systems
- Many technical regulations and mandatory standards of China

Economic benefits generated by standards: CNY 13.3 million (USD 2 million) annually (around 12% of the revenues of the R&D function).

Key qualitative benefits: Information sharing inside DISC and with suppliers was improved.

What were the major benefits for DISC of using standards?

Using standards allowed DISC to:

- Improve the design of ships and components based on customer requirements
- Reduce design errors and ensure safety
- Promote customer confidence through widespread use of standards
- Reduce negotiation time by referencing standards
- Ensure compliance with regulatory requirements
- Unify and re-use design documentation
- Ease cooperation with suppliers through use of agreed standards-based solutions

How did standards lead to these benefits?

Standards are applied extensively by all DISC engineering offices. They make it possible to refer to proven solutions, helping to reduce risk and shorten design cycles. They also facilitate the re-use of solutions developed in other projects and their application to new projects. Standards make compiling technical instructions for contracts easier, allowing greater accuracy in determining technical parameters and reducing the time needed to reach agreement with ship owners. The compilation of test files follows standardized rules and formats, which improves work efficiency and design quality.

Standards facilitate the design selection process, leading to streamlined manufacturing and installation of equipment and components, which also helps to increase design quality and work efficiency. Lastly, they lay down specific requirements for indicators, making documentation faster and simpler to prepare.



Xinxing Ductile Iron Pipes

Standards creating process efficiencies

Born out of a military steel plant founded in 1971, the company has been listed on the Shenzhen Stock Exchange since 1997 and belongs to the Xinxing Cathay International Group under the state-owned Assets Supervision and Administration Commission of China. Xinxing is the largest producer of ductile iron pipes and steel gratings in China, claiming over 45% of the domestic market. The company also has a substantial share of the world market, with exports to some 100 countries generating 30% of its revenue.

Company name: Xinxing Ductile Iron

Pipes Co. Ltd.

Country: China

Industry: Pipes and piping systems

No. of employees: In scope of

assessment: 5276 (of a total of 17499)

Revenues/profits:

In scope of assessment: CNY 10 billion/CNY 488 million (USD 1.5 billion/USD 73.8 million) Total revenue:

CNY 37.6 billion (USD 5.7 billion) (in 2010)*

Main products/services:

Iron and steel pipes for use in water supply and industrial waste disposal systems, communications, electrical power, petroleum and other sectors. The assessment focused on two factories of Xinxing in the Wuan industrial zone of Handan City, Hebei Province, that produce cast pipes and steel products.

Main use of standards: Standards are used in all company operations, impacting primarily the following areas:

- Production
- Marketing and sales





- · Procurement, including supplies testing
- Engineering
- Research and development

Most important standards used:

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems
- Various Chinese national and industry-sector standards on design specifications, product requirements, raw materials and testing
- Various technical regulations and mandatory standards of China

Economic benefits generated by standards: CYN 68 million annually (USD 10.3 million), amounting to 0.68% of annual sales revenue and close to 14% of the EBIT of the business units in scope.

Key qualitative benefits: Standards improved integration and streamlining of company operations.

What were the major benefits for Xinxing of using standards?

Compliance with a number of standards is a prerequisite for obtaining production licenses, as many products are subject to requirements defined in regulations or mandatory standards. Using standards also allowed Xinxing to:

- Produce high-quality, low-cost products while remaining competitive
- Ensure the consistent quality of its iron and steel products
- Gain in efficiency through implementing proven solutions, reducing errors and re-using design solutions developed for previous projects
- Achieve cost reductions in procurement
- Simplify tenders
- Meet requirements in product certification

How did standards lead to these benefits?

Xinxing used management system standards as a framework for organizing projects and integrating operations into a common approach. This was a pre-condition for producing high-quality, low-cost pipes that have wide application. By streamlining operations and reducing unnecessary costs, Xinxing was able to sustain its leadership position in a highly competitive market. By providing tested and widely accepted solutions, standards proved an essential tool for securing this position.

^{*} CNY 1 = USD 0.15124 (2010-12-31)



Chococam

Standards improving food safety and product quality

The Chococam company (Chocolate Confectionery Cameroon) began its operations in 1967 as part of the Swiss group Barry Callebaut, the world's number one manufacturer of bulk chocolate. In August 2008, the majority of Barry Callebaut shares were purchased by the Tiger Brands Group, a dynamic brand of packaged consumer goods operating mainly in South Africa and in some emerging markets.

Company name: Chococam

Country: Cameroon

Industry: Agri-food business

No. of employees: 470 (of which 168 are temporary and pieceworkers)

Revenues/profits: XAF 19 billion (USD 37.6 million)/N.A. (in 2010)*

Main products/services:

Confectionary products, chocolate bars and other products, and chocolate spread

Main use of standards:

- Procurement, including inspection of supplies
- Stock management
- Production and operations
- · Maintenance of equipment

- ISO 9001:2008, Quality management systems
- Some ISO standards on microbiological analysis, such as ISO 7402, ISO 4833, ISO 7954, ISO 6579
- NC 04:2000-20, Labelling of pre-packaged foods (Cameroonian standard)
- Various FAO/Codex Alimentarius standards





- European Commission regulations
- European Good Hygiene Practices

Economic benefits generated by standards: XAF 991 million (USD 1.96 million) annually (5.2% of total annual sales).

Key qualitative benefits: Standards helped create a culture of quality consciousness at all levels of the company.

What were the major benefits for Chococam of using standards?

Using standards allowed Chococam to:

- Improve the detection rate of non-conforming supplies
- Deliver products of consistently high quality, resulting in enhanced customer satisfaction
- Reduce costs through more efficient stock management
- Optimize operations and manage processes in a systematic manner
- · Raise staff competencies through training
- Reduce maintenance costs for equipment

How did standards lead to these benefits?

Introducing the ISO 9001 quality management system was core to the benefits generated by standards. It provided Chococam with a systematic approach to management, leading to improvements in fundamental processes such as procurement and the inspection of supplies for a better detection of non-conformities and an overall higher quality. The standard further helped streamline the production process and provide a clearer definition of staff functions and responsibilities. On this basis, training was organized to enhance employees' skills. All these measures have generated increased customer satisfaction, higher sales revenues and substantial savings in stock-keeping and maintenance costs.



Water Senegal Sénégalaise Des Eaux

Standards supporting a unified approach to management

Founded in December 1995 in Senegal's capital Dakar, Sénégalaise des Eaux (SDE), a private limited company, has been instrumental in establishing a viable urban drinking water system for its country and is the reference in Africa for drinking water services.

SDE operates within a "public-private partnership" institutional framework, meaning that the company is bound to government agencies by a performance contract that aims to improve public water services in Senegal and sets the technical and financial performance targets to be achieved.

Company name: Water Senegal/ Sénégalaise des Eaux (SDE)

Country: Senegal

Industry: National water supply

No. of employees: 1139

Revenues/profits: XOF 73.1 billion/N.A.

(USD 144.7 million/N.A.) (in 2010)*

Main products/services:

Drinking water services

Main use of standards:

Standards were used to streamline operations in drinking water services.

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems
- · Some French national standards on water quality and testing





• Some Senegalese national standards on water discharge and air pollution

Economic benefits generated by standards: XOF 1.4 billion (USD 2.77 million) annually, amounting to 1.9 % of annual sales revenue.

Key qualitative benefits: Standards helped manage business operations more reliably and efficiently.

What were the major benefits for SDE of using standards?

Using standards allowed SDE to:

- Establish clear, well-defined links between the company's strategic directions and their implementation "by-process" and business function, so as to meet the ambitious performance objectives and promote a culture of continual improvement
- Help satisfy the needs of the Senegalese population for reliable water access (with increased customer satisfaction)
- Improve overall efficiencies in operations
- Ensure positive occupational health and safety conditions for SDE's employees and suppliers

How did standards lead to these benefits?

The introduction of an integrated management system incorporating best practices from several standards has been key to enabling a systematic approach to management and laying the foundations for a culture based on continual improvement. The "public letter of engagement", issued by the CEO at the beginning of each year, plays an essential role in setting the company's key targets and policies and serves as a basis for defining the specific objectives and tasks of each organizational unit. These are later operationalized through performance indicators which are monitored on a monthly and weekly basis to measure whether progress is taking place as intended. This approach has helped drive process efficiency and identify opportunities for future development.

Other standards on water quality and testing are used to ensure that the required volumes of water are delivered and meet the agreed quality levels.



Mapei

Standards promoting higher quality and paving the way for international expansion

Founded in 1937, Mapei was a very small producer of varnishes and waterproofing agents. The company later diversified into adhesives for floor and wall coverings, introducing a set of innovative products. Today, the Mapei Group is the world's leading manufacturer of mortars, adhesives, grouts, sealants, waterproofing agents, additives for concrete, and other specialty products for the building industry. The Group comprises 68 subsidiaries, 18 main research and development centres, and 60 production facilities in operation in over 27 countries.

Company name: Mapei

Country: Italy

Industry: Construction and construction materials

No. of employees: 7500

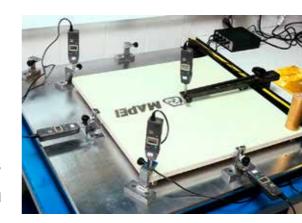
Revenues/profits:

EUR 1.8 billion/EUR 73 million (USD 2.4 billion/USD 96.7 million) (Mapei Group) (in 2010)*

Main products/services:

Chemical specialty products for the building industry, such as adhesives, mortars, sealants, varnishes, etc.
The assessment focused on adhesives for the ceramic floor and wall tiles business unit, which generates around 40% of the Group's total sales.





Main use of standards:

- Research and development and technical assistance
- Production, including quality assurance
- · Marketing and sales

Most important standards used:

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems
- SA 8000, Social accountability
- ISO 10002, Customer complaints handling
- Various EN and ISO standards defining product requirements, testing methods, etc. (e.g. ISO 13007, EN 12004)

Economic benefits generated by standards: EUR 2.12 million (USD 2.8 million), amounting to 0.12% of revenue and 2.9% of the EBIT of Mapei Group.

Key qualitative benefits: Standards contributed to the harmonization of management practices and business processes throughout the Group's subsidiaries.

What were the major benefits for Mapei of using standards?

Using standards allowed Mapei to:

- Communicate to the market the high value of its products
- Sustain its strong international expansion by using consistent management systems for the transfer of knowledge, good practices and operational procedures
- Support a high rate of product innovation

How did standards lead to these benefits?

The implementation of an integrated management system based on International Standards (for quality, safety and environmental aspects) has been core to Mapei's strategy, helping to structure and harmonize business processes in line with market growth objectives, and combining specific local requirements with knowledge and experience acquired on a global scale. Product standards (in particular ISO 13007 or the European EN 12004) and the European CE marking practice have played a large part in disseminating clear and objective information on the performance of adhesives, thus paving the way for better-quality products that have considerable user benefits in terms of the ease and speed of installation. This has been extremely beneficial to Mapei, whose primary offer is focused on high-quality innovative products. A key condition to Mapei's success in implementing standards is its active participation in the standards development process as this affords the opportunity to influence the standards' content as well as obtain first-hand information on new trends in the industry's technological developments.

^{*} EUR 1 = USD 1.32515 (2010-12-31)



Baltika Breweries

Standards sustaining quality and process efficiencies

The Russian state enterprise Baltika Brewery was established in 1990 and privatized in 1992. Baltika's vision was to brew the finest-quality European beer using traditional technology. The company began its regional expansion in 1997 and merged with other breweries, changing its name to Baltika Breweries. It was then acquired in 2012 by the Carlsberg Group (Denmark), one of the world's largest breweries. Today, Baltika is the Russian Federation's leading beer brand with a market share of 38.2% and one of the largest, fastest-moving consumer goods companies in Russia.

Company name: Baltika Breweries

Country: Russian Federation

Industry: Beer production/breweries

No. of employees: 8840

Revenues/profits:

RUB 89.2 billion/RUB 6.28 billion (USD 2.7 billion/USD 194.8 million) (in 2012)*

Main products/services:

Large portfolio of beers (and some non-alcoholic beverages)

Main use of standards:

- Procurement
- Testing of incoming materials
- Production
- Distribution
- After-sales services

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems
- HACCP, Hazard analysis and critical control points





- FSSC 22000, Food safety certification system based on ISO 22000
- ISO 10002:2004, Customer complaints handling
- European Brewery Convention standards (for malt and beer)
- Many GOST standards (for malt and beer, storage, after-sales service)
- Federal regulations for the transport of food and beverages

Economic benefits generated by standards: 3.4% of annual revenue (RUB 3 billion or USD 94.1 million).

Key qualitative benefits: Standards helped establish efficient high-quality manufacturing and product branding as well as an extensive distribution network.

What were the major benefits for Baltika of using standards?

Using standards allowed Baltika Breweries to:

- Increase labour productivity
- Lower purchasing costs for raw materials used in brewing
- Decrease its environmental footprint by saving electricity, water and other resources
- Build up a reputation as manufacturer of fine beers with a large portfolio of products
- Support a wide distribution network with sales outlets throughout the Russian Federation

How did standards lead to these benefits?

The implementation of widely used standards of the European Brewery Convention enabled Baltika to purchase raw materials on the international market for a lower price. This had not been possible before when Baltika relied exclusively on GOST standards for procurement. By requesting that their suppliers implement a robust quality management system, Baltika was able to secure supplies of consistently high quality, which made it possible to reduce the frequency of laboratory testing and transfer some of the laboratory staff to other operations.

Baltika's management system, based on ISO 9001 and ISO 14001, was instrumental in streamlining processes, integrating acquired companies and optimizing cooperation between factories, resulting in a significant increase in labour productivity. Standards were also used in the refitting of railway wagons needed to deliver products, which is a precondition for operating a nationwide system of sales outlets. Finally, by turning to ISO 10002 for customer complaints handling, Baltika was able to improve its operations by encouraging customers to identify the company's weaknesses, offer suggestions and express their preferences.

^{*} RUB 1 = USD 0.03103 (2012-12-31)



City Square Mall

Standards helping to reduce energy consumption

City Square Mall (CSM), Singapore's first eco-mall, opened in 2009. Developed, owned and managed by City Developments Limited, one of Singapore's leading international property and hotel conglomerates, CSM is conceived as a miniature "town centre" that provides the perfect setting for the community to meet, play and shop while acquiring an eco-learning experience.

CSM disposes over 65 000 m² of gross retail space, spread over five storeys, two basements and four levels of lifestyle services. Hosting around 200 retailers, the mall offers a wide array of merchandise and services, promotional activities, as well as street fare and international cuisine.

Company name: City Square Mall

(CSM), Singapore

Country: Singapore

Industry: Retail – Shopping mall

No. of employees: Several thousand

Revenues/profits: -

Main products/services:

CSM is a public facility in downtown Singapore providing retail outlets for many types of goods and services.

Main use of standards:

The study focused on CSM's implementation of Singapore Standard SS 530 to reduce the energy consumption of its air-conditioning system, which accounts for 30 % to 50 % of the overall electricity usage.

CITY SQUARE MALL



Most important standards used:

• Singapore Standard SS 530:2006, Energy efficiency for building services and equipment

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems
- OHSAS 18001:2007, Occupational health and safety management systems
- SS 553:2009, Air-conditioning and mechanical ventilation in buildings
- ARI (Air-Conditioning and Refrigeration Institute) standards

Economic benefits generated by standards: Annual savings of SGD 320 000 in electricity costs (around USD 262 000).*

Key qualitative benefits: Standards have helped set CMS up as an example for eco-efficiency, performance and cost savings for similar installations in Singapore and beyond.

What were the major benefits for City Square Mall of using standards?

Using SS 530 on energy efficiency in buildings allowed City Square Mall to:

- Design and run an eco-efficient mall on significantly less energy than traditional malls
- Systematically analyse the energy consumption in its buildings and identify functions that were particularly energy-intensive, such as the air-conditioning equipment

How did standards lead to these benefits?

Singapore Standards SS 530 and SS 553 were implemented during the design phase of the new mall, which was planned as an energy-efficient and eco-friendly environment attractive to all types of shoppers and families. Following the standards' principles and guidelines, high-performing air-handling control, lighting, fire safety, mechanical ventilation and elevator systems were integrated into the design, allowing for significant energy savings. An external specialized service provider was hired to monitor energy use and ensure optimal operation of the air-conditioning system. All these initiatives make City Square Mall the first eco-mall in Singapore and a ground-breaking example for similar facilities and projects.

^{*} SGD 1 = USD 0.81695 (2012-12-31)



Standards building a resilient company

Founded in 1968, Teckwah has evolved from a manufacturer of plain paper boxes to a leading solutions provider of customized supply chain management services. The company offers a variety of products and services, including the new packaging solution neupack, business process outsourcing, e-commerce, Web-based procurement and fulfilment click solutions, service-parts logistics and reverse logistics solutions.

Company name: Teckwah Industrial

Corporation Ltd.

Country: Singapore

Industry: Printing and packaging solutions, logistical services

No. of employees: 1300

Revenues/profits:

N.A./SGD 13.5 million (N.A./USD 11 million) (EBIT in 2011)*

Main products/services:

Wide portfolio of packaging solutions (including special-purpose packaging)

Main use of standards:

- Procurement
- IT services
- Production
- Business development (marketing and sales)

Most important standards used:

Teckwah uses a variety of standards including:

- ISO 9001:2008, Quality management systems
- ISO 14001:2004, Environmental management systems

teckwah group®



- OHSAS 18001:2007, Occupational health and safety management systems
- ISO 28000:2007, Supply chain security management
- ISO 12647-2:2004, Offset lithographic processes

The assessment focused on the impact of the Singapore Standard SS 540:2008, *Business continuity management* (BCM).

Economic benefits generated by this standard: SGD 1.45 million (USD 1.18 million) annually, amounting to 10.6% of EBIT.

Key qualitative benefits: Standards helped strengthen Teckwah's and Singapore's capacity to build a resilient society.

What were the major benefits for Teckwah of using standards?

Using Singapore Standard SS 540 allowed Teckwah to:

- Build organizational resilience by identifying key risks that could lead to business disruptions
- Achieve business continuity by seamlessly transferring internal and external operational information between Teckwah and its key suppliers and customers
- Ensure continuous supply and flow of raw materials
- Secure important contracts as a BCM-certified company through increased customer confidence in Teckwah's ability to avoid or mitigate impacts from disruptive incidents

How did this standard lead to these benefits?

The implementation of the SS 540 standard on business continuity management started with a systematic business impact analysis to identify potential impacts that a disruptive incident would have on Teckwah. The company relies heavily on IT services and decided to move its server farm off its premises to a more secure physical location. The data backup frequency was also stepped up from once every three days to once a day to limit potential data loss.

Finally, production staff were trained, each within their role and responsibilities, to execute business continuity plans and were given adequate resources to do so.

^{*} SGD 1 = USD 0.81695 (2012-12-31)



Full titles of standards referenced in the case studies

The standards listed below are given with their latest publication year. For the edition applied in a particular company, please refer to the respective case study.

Reference No.	Title
ISO 3633:2002	Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings – Unplasticized poly(vinyl chloride) (PVC-U)
ISO 4435:2003	Plastics piping systems for non-pressure underground drainage and sewerage – Unplasticized poly(vinyl chloride) (PVC-U)
ISO 4833-1:2013	Microbiology of the food chain – Horizontal method for the enumeration of microorganisms – Part 1 : Colony count at 30 $^{\circ}$ C by the pour plate technique
ISO 4833-2:2013	Microbiology of the food chain – Horizontal method for the enumeration of microorganisms – Part 2: Colony count at 30°C by the surface plating technique
ISO 6579:2002	${\it Microbiology of food and animal feeding stuffs-Horizontal method for the detection} of Salmonella spp.$
ISO 6780:2003	Flat pallets for intercontinental materials handling — Principal dimensions and tolerances
ISO 7402:1993	Microbiology – General guidance for the enumeration of Enterobacteriaceae without resuscitation – MPN technique and colony-count technique
ISO 7954:1987	Microbiology – General guidance for enumeration of yeasts and moulds – Colony count technique at 25°C
ISO 9001:2008	Quality management systems – Requirements
ISO 10002:2004	$\label{eq:Quality} \textit{Quality management} - \textit{Customer satisfaction} - \textit{Guidelines for complaints handling in organizations}$
ISO 12647-2:2013	Graphic technology – Process control for the production of half-tone colour separations, proof and production prints – Part 2: Offset lithographic processes
ISO 13007 series	Ceramic tiles – Grouts and adhesives
ISO 14001:2004	Environmental management systems – Requirements with guidance for use
ISO 1452 series	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure – Unplasticized poly(vinyl chloride) (PVC-U)
ISO 22000:2005	Food safety management systems – Requirements for any organization in the food chain
ISO 28000:2007	Specification for security management systems for the supply chain
ISO/TS 16949:2009	Quality management systems – Particular requirements for the application of ISO 9001:2008 for automotive production and relevant service part organizations
ISO/IEC 16390:2007	Information technology – Automatic identification and data capture techniques – Interleaved 2 of 5 bar code symbology specification
ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories
ISO/IEC 24730 series	Information technology – Real-time locating systems (RTLS)
AHRI 260-2001	Sound rating of ducted air moving and conditioning

Reference No.	Title
AHRI 350-2008	Sound rating of non-ducted indoor air-conditioning equipment
AHRI 430-2007	Performance rating of central station air-handling units
ANSI/AHRI 440-2002	Performance rating of room fan-coils
BASC 03-2008	Business Alliance for Secure Commerce Standard
BOS 28	Burnt clay masonry units (based on SANS 227)
DIN EN ISO 9001:2008-12	Quality management systems – Requirements
EAN 13	International Article Number (originally European Article Number, but now re-named) with a 13-digit barcode
EN 12004:2012	$Adhesives for {\it tiles-Requirements}, evaluation of conformity, classification and designation$
EN 13476 series	Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE)
Global GAP Version 03	Good Agricultural Practice for safe and sustainable agriculture
HACCP	Hazard Analysis Critical Control Point
IEEE 802.15.4:2011	IEEE Standard for local and metropolitan area networks — Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs)
ITF14	Interleaved Two of Five: GS1 implementation of an interleaved 2 of 5 bar code to encode a Global Trade Item Number with 14 digits
NC 04:2000-20	Labelling for pre-packaged foodstuffs
NL 53:1999	Cements — Portland cement type P, Portland composite cement type Pa with additives, composite cement type C
NTP 011.109:2008	ESPÁRRAGO. Espárrago fresco. Requisitos (ASPARAGUS. Fresh asparagus. Requirements)
NTP 011.116:1991	ESPÁRRAGOS. Guía para el transporte refrigerado (ASPARAGUS. Guidelines for refrigerated transport)
NTP 209.401:2001	ESPÁRRAGOS. Prácticas de higiene para procesamiento de espárrago fresco (ASPARAGUS. Hygienic practices for processing fresh asparagus)
OHSAS 18001:2007	Occupational health and safety management systems – Requirements
SA 8000:2008	Social Accountability (by Social Accountability International)
SANS 227:2007	Burnt clay masonry units
SANS 1841:2008	${\it Control of the quantity of contents in prepacked packages within the prescriptions of legal metrolology}$
SANS 50196 series	Methods of testing cement – Part 1 : Determination of strength
SANS 50197-1:2013	Cement-Part 1: Composition, specifications and conformity criteria for common cements
SANS 50197-2:2000	Cement – Part 2: Conformity evaluation
SS 334:2010	Specification of timber flat pallets
SS 530:2005	Energy efficiency standard for building services and equipment
SS 540:2008	Singapore standard for business continuity management (BCM)
SS 553: 2009	Air-conditioning and mechanical ventilation in buildings
SS CP 95:2002	Code of practice for Cold Chain management – Milk and dairy products
SS CP 552:2009	Code of practice for Cold Chain management of chilled pork
UL	Underwriters' Laboratories
US GAP	U.S. Good Manufacturing Practices
VDA Volume 6, Part 4	Quality management system for equipment suppliers in the automotive industry



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