Mapei, Italy

Country : Italy
ISO member body : Ente Nazionale Italiano di Unificazione (Italian National Standards Body - UNI)
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Duration of the study : September 2011 – June 2012

Overview

The possibility of describing and quantifying the economic benefits of standards is of great importance in monitoring and addressing standardization activities, and for improving the awareness, the communication and the promotion of the use of standards. It also encourages the participation of interested parties in technical work in support of standards development.

For this reason, ISO developed and made available to its members, a study to support organizations in assessing the impact derived from the application of standards, or from the development of new standards.

Called the ISO Methodology, it is based on the value chain approach, consisting of a systematic representation of all the activities of an organization, including the suppliers' value chain, and on the principle of collecting data related to those business functions on which the impact of standards is evident, in order to convert them into business values for each single function and for the whole organization.

For the application of methodology in Italy, UNI, the national standardization body of Italy, assigned competent internal human resources and strengthened collaboration with the Faculty of Management Engineering of the University of Pisa. The Mapei Group was selected as the organization to be studied, representing the construction products and buildings sector of the chemical industry.

11.1 Objectives and organization of the pilot project

The scope of the project is to assess quantitatively the economic benefits derived from the application of International, European, national and other "external" standards by Mapei.

The project is based on the comparison between the situation before and after the application of specific standards over a period of time by selected business functions, and the successive assessment of benefits in terms of reduced costs, improvement in company and product quality, increased sales, income and profit, and growing market share.

11.2 Introduction to the company

Founded in Milan in 1937, Mapei was established to produce rendering and plastering mortars and wall coverings, and in particular, varnishes and waterproofing products. Later, Mapei diversified into the production of adhesives for floorings and wall coverings.

During the 1960s, in parallel with the growth of the Italian flooring and ceramic tile industry, Mapei recognized the need for adhesive materials that would make tile installation faster and more secure. As a result, the company developed products that provided its customers with timesaving processes, more reliable installations and better yields.

Following the world ceramic tile industry boom in the 1980s, Mapei implemented an internationalization strategy based on the development of new manufacturing plants and the acquisition of new companies in Europe, North America and elsewhere, to serve the needs of local markets and to reduce shipping costs to a minimum. The range of products became wider and included admixtures, parquet, resin floor coverings, textiles, waterproofing agents, thermal and acoustic insulation and sealants, and other building products.

Mapei developed an extensive technical-commercial network in the most important countries of the world, with a strong focus on logistics, fast product delivery (80 % of orders are delivered within 48

hours of receipt) and an efficient on-site technical assistance service, highly appreciated by designers and installers.

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 on the five continents, each with its own quality control laboratory. Total group revenue in 2010 was over EUR 1.8 billion.

Mapei has always placed great emphasis on research and development, aiming at improving the quality, safety and ease of use of its products. Today, the company's main R&D efforts are directed at developing eco-sustainable and environmentally friendly products.

Standardization, both at the European (CEN) and International (ISO) level, has been very important for Mapei, and its industrial processes have evolved in sync with the development and use of CEN and ISO standards for the sector (the importance of standards is paramount in Europe where CE marking of construction products is mandatory).

Standards are extensively used by several business functions of the company (that is, technical assistance, marketing, quality assurance and laboratories) and are considered as an assurance of customer care.

Since 1994, Mapei has implemented a quality system in conformity with ISO 9001, later integrated with ISO 14001 and OHSAS 18001. Management systems standards have played a very important role for Mapei, as described in the following sections.

11.3 Company attitude towards standardization

Mapei is a company strongly engaged in standardization, both in terms of application of standards and of participation in standards development.

The company rigorously applies existing voluntary standards relevant to its products (mainly EN and ISO, (as shown in **Table 1,** see 11.6) in the framework of its core business processes and functions, particularly in relation to quality control and compliance.

Mapei also participates actively in the development of standards within UNI's specialized Italian national mirror committees, and often represents Italy in CEN and ISO technical bodies (covering the field of adhesives for ceramic tiles).

Standards for terminology, testing and product properties are considered important tools that help to harmonize and streamline the company's design and manufacturing processes.

Moreover, product standards are seen by Mapei as strategic tools that support its value proposition and its perception by customers, because :

- By defining broadly accepted parameters to determine product characteristics and performance, standards help to clearly differentiate products on the market
- In such a way, standards contribute to spreading a " culture of quality ", making it easier for customers to understand the benefits of higher quality products. This contributes to strengthening Mapei's competitive advantage, resulting from the company's focus on product quality and innovation

Management system standards also play a very important role at Mapei.

The company has thoroughly implemented ISO 9001 and other management system standards that have supported it in its fast

but sustainable international expansion (between 1994 and 2012, the number of Mapei manufacturing plants around the world grew from six to 60).

11.4 Value chain analysis

11.4.1 Industry value chain

Italy is the third largest chemical producer in Europe, following Germany and France. The chemical industry sector comprises some 3 000 companies and 115 000 employees, and had a production value of EUR 52.6 billion in 2010 (pharmaceutical industry excluded).

Mapei is the third largest Italian chemical group and is specialized in the construction sector. The company makes use of raw materials – mainly non-organic such as cements and sands – operates batch manufacturing processes and, as final products, delivers chemical specialties to the construction sector (such as mortars and adhesives), as well as consumer products (such as sealants and varnishes).

The company is significantly integrated upstream, having acquired over time a number of suppliers of strategic raw materials, such as Gorka Cement in Poland (supplier of aluminous cement), and VAGA. (high quality sands) and Vinavil (vinyl acetate polymers) in Italy. Mapei also has a significant international network of suppliers of key raw materials such as aluminous cement and sands. Given the relatively low cost and high incidence of transport for such raw materials, the suppliers' proximity to the manufacturing plants serving local markets is very important.

Mapei operates through a diversified network of distribution channels including retailers of construction and building material products, contractors (typically for large scale projects) and a variety of associ-

ated professionals (such as architects, quantity surveyors, structural engineering consultants, installers). Helping distributors and installers to get the most from Mapei's products is a company priority – information services, on-site assistance and vocational training for retailers and professionals are strong and distinctive elements of Mapei's value proposition.

As a specialty supplier to the construction industry, the company is primarily connected to the dynamic of this sector. The global recession has led to a sharp downsizing of several important construction markets (including, in particular, Italy) over the last five years. This has clearly had an impact on Mapei's performance. However, by pursuing a strategy oriented towards product innovation, quality of service and internationalization strategy, the company has been able to continue to grow and maintain its profitability.

11.4.2 Company value chain

Since 1994, Mapei has implemented and continually upgraded a quality management system in conformity with ISO 9001. This system, designed and operated to meet customer needs, was then improved and integrated with other management systems in accordance with international standards (see **Figure 1)**.

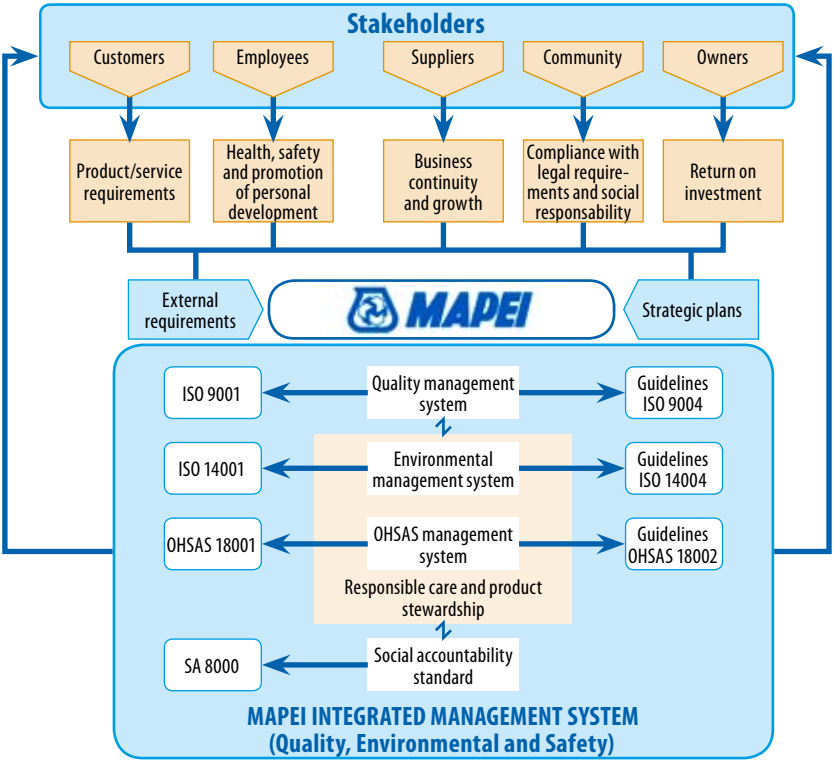

Figure 1 – Interaction among interested parties and the integration of management systems

The integrated management system has a prominent role in Mapei's strategy and operational culture. The company value chain and core business processes (with related business functions) are represented using as a reference the P-D-C-A (Plan-Do-Check-Act) framework adopted by all ISO management system standards (see **Figure 2)**.

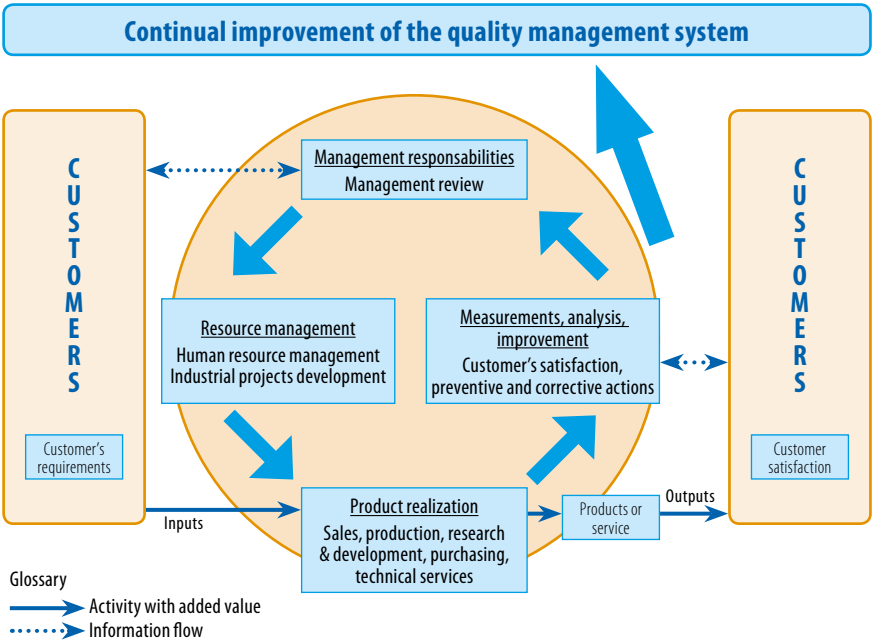

Figure 2 – Management system business model based on processes

From Mapei's documentation, it is clear that particular attention is given to customers and to building sector professionals.

Mapei's business processes are structured on the notion that the company's success strongly depends on its capacity to understand and meet the needs of its customers and final users, offering them competitive solutions with high added value, both in terms of product performance and service.

Analysis and planning of customer requirements is at the basis of the sales process, which comprises the following activities:

- Pre-sale, when objectives and dedicated budgets are defined and offers to existing and potential customers are made
- Order processing
- Product delivery

- Analysis of sales results (including profitability) with a view to defining future corrective actions. The outcome of this analysis becomes part of the input of subsequent sales processes, aiming at continual improvement of the process

During the different phases of the sales process, the technical assistance service is always at the customer's side, providing prompt and effective responses to avoid any technical problems in the use of products and, in this way, contributing to customer loyalty.

Production amounts to some 16 000 tons of finished products per day, and more than 1 000 different types of products. Total production is over 3.7 million tons per year. Just in time logistics enables Mapei to process 80 % of orders within 48 hours (both packaged and bulk products).

The efficiency of the logistics process is another key element of Mapei's success.

11.4.3 Key value drivers

Four key value drivers have been identified on the basis of information gathered through interviews and official company documents (quality manual and others) :

- **Product innovation**, that is, the capacity to transfer the results of research and development into commercial products, thus continually improving the company portfolio
- **Product quality and reliability**
- **Customer service**, in particular, technical assistance to guarantee the optimal use of company products, and an efficient delivery service to provide products with minimum possible delay
- **Health, safety and environmental protection**, ensuring that the performance of Mapei's products and processes exceed legal requirements for compliance.

It is important to emphasize that these value drivers, strongly rooted in a quality-oriented, continual improvement philosophy, have been clearly recognized and confirmed by all the staff members interviewed during the study. In other words, it seems clear that they effectively guide the company's strategy and operations.

11.5 Scope of the assessment

It was decided to focus the analysis on Mapei's adhesives for ceramic floor and wall tiles business, since 40 % of sales are derived from this single product line, while the remaining 60 % is covered by other eight product lines.

It was also decided to investigate the issue of Volatile Organic Compounds (VOCs). VOCs are emitted as gases from certain solids or liquids, and include a variety of chemicals that may have short- and long-term adverse health effects. They are present in various products, especially resins, and are of growing concern in relation to health and safety. They also raise environmental concerns associated with substances used for construction.

It should also be noted that questions regarding the impact of Mapei's integrated management system could not be restricted to the adhesives business line alone, and estimates have been calculated for the whole company.

Standards define an " adhesive " as a non-metallic substance capable of joining materials by surface adhesion and cohesion. Adhesives for tiles are defined on the basis of the chemical nature of their binders. They present specific characteristics in terms of applicability, properties and final performance, and, according to ISO 13007 (or European EN 12004), they are classified as cementitious, dispersion and reaction resin adhesives.

Cementitious adhesives, designated as "type C", are a mixture of hydraulic binding agents, aggregates, and organic additives (for example, latex polymers, moisture retention additives, etc). These adhesives are mixed with water or a liquid admix just before use.

Dispersion adhesives, designated as "type D", are ready-to-use mastic type mixtures of organic binding agents in the form of an aqueous polymer dispersion, containing organic additives and mineral fillers.

Reaction resin adhesive, designated as "type R", are single or multi-component epoxy or urethane based mixtures of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction.

ISO 13007 requires that an adhesive pass certain minimum performance tests before it may be accredited with a Performance Classification. This classification is expressed as letters and numbers in an easy-to-use and understand code. For each type of adhesive, it is possible to have one of two classes, and different optional characteristics of the adhesive based on performance (fast-setting/drying, slip-resistance, extended open time, exterior glue plywood, deformability). The designation of the adhesive consists of the letter for the adhesive type (C, D or R), followed by the number of the class (1 or 2), and/or the corresponding letter for the characteristic(s) of the adhesive (F, T, E, P and S).

Mapei's primary offer consists of cementitious adhesives (type C adhesives). The manufacturing process is managed by computerized numerical control (CNC) machines that mix and transfer raw materials and components from storage systems and silos to mechanically packaged boxes. Output is in the order of 70 bags per minute, which means, for standard packaging of 25 kg per bag, a production rate of about 30 kg per second.

11.6 Use of standards in the company value chain

Four Mapei business functions have been identified as primary standards users:

- Technical assistance (11.6.1)
- Sales department (11.6.2)
- Research and development (11.6.3)
- Quality assurance (11.6.4), in particular Production and logistics.

The following table lists the standards used by the Mapei Group, with a focus on ceramic tile adhesives and volatile organic compounds (VOC).

Management system standards
EN ISO 9000:2005, *Quality management systems – Fundamentals and vocabulary*
EN ISO 9001:2008, *Quality management systems – Requirements*
EN ISO 9004:2009, *Managing for the sustained success of an organization – A quality management approach*
EN ISO 14001:2004, *Environmental management systems – Requirements with guidance for use*
ISO 10001:2007, *Quality management – Customer satisfaction – Guidelines for codes of conduct for organizations*
ISO 10002:2004, *Quality management – Customer satisfaction – Guidelines for complaints handling in organizations*
EN ISO 19011:2011, *Guidelines for auditing management systems*
OHSAS 18001:2007, *Occupational health and safety management systems – Requirements*

Product standards	
European Standards	**International Standards**
EN 12004:2008, *Adhesives for tiles – Requirements, evaluation of conformity, classification and designation*	ISO 13007-1:2010, *Ceramic tiles – Grouts and adhesives* – Part 1 *: Terms, definitions and specifications for adhesives*
EN 1308:2007, *Adhesives for tiles – Determination of slip*	ISO 13007-2:2010, *Ceramic tiles – Grouts and adhesives* – Part 2 *: Test methods for adhesives*
EN 1323:2007, *Adhesives for tiles – Concrete slabs for tests*	
EN 1324:2007, *Adhesives for tiles – Determination of shear adhesion strength of dispersion adhesives*	
EN 1346:2007, *Adhesives for tiles – Determination of open time*	
EN 1348:2007, *Adhesives for tiles – Determination of tensile adhesion strength for cementitious adhesives*	
EN 12002:2008, *Adhesives for tiles – Determination of transverse deformation for cementitious adhesives and grouts*	
EN 12003:2008, *Adhesive for tiles – Determination of shear adhesion strength of reaction resin adhesives*	
EN 1347:2007 Adhesives for tiles – Determination of wetting capability	
EN 13888:2009, *Grouts for tiles – Requirements, evaluation of conformity, classification and designation*	ISO 13007-3:2010, *Ceramic tiles – Grouts and adhesives* – Part 3 *: Terms, definitions and specifications for grouts*
EN 12808-1:2008, *Grouts for tiles* – Part 1 *: Determination of chemical resistance of reaction resin mortars*	ISO 13007-4:2010, *Ceramic tiles – Grouts and adhesives* – Part 4 *: Test methods for grouts*
EN 12808-2:2008, *Grouts for tiles* – Part 2 *: Determination of resistance to abrasion*	
EN 12808-3:2008, *Grouts for tiles* – Part 3 *: Determination of flexural and compressive strength*	
EN 12808-4:2009, *Grouts for tiles* – Part 4 *: Determination of shrinkage*	
EN 12808-5:2008, *Grouts for tiles* – Part 5 *: Determination of water absorption*	
EN 14891:2007, *Liquid applied water impermeable products for use beneath ceramic tiling bonded with adhesives – Requirements, test methods, evaluation of conformity, classification and designation*	ISO/NP 13007-5, *Ceramic tiles – Grouts and adhesives* – Part 5 *: Liquid applied waterproof membranes for the installation of ceramic tiles*

VOC standards
EN 13999-2:2007, *Adhesives – Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application* – Part 2 *: Determination of volatile organic compounds*
EN ISO 16000-9:2006, *Indoor air* – Part 9 *: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method*
EN ISO 16000-10:2006, *Indoor air* – Part 10 *: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test cell method*
EN ISO 16000-11:2006, *Indoor air* – Part 11 *: Determination of the emission of volatile organic compounds from building products and furnishing – Sampling, storage of samples and preparation of test specimens*

Table 1 – The most important standards used by Mapei

11.6.1 Technical assistance (Milan headquarters)

The department is composed of 20 people, assisting clients by providing advice over the phone or, for more complex cases, intervening directly on site. The department is also involved in at least four major construction projects (worldwide) per year.

Its main activities are :

- To prepare and handle the technical product documentation
- To assist the customer in choosing and using the product suitable for the intended use
- To organize courses for final users, mainly installers and designers
- To handle complaints, in accordance with ISO 10002

The main benefit resulting from the use of standards, as indicated by the departmental managers, is their contribution to bringing clarity on the level of performance of the various types of products available on the market.

Another significant benefit is the simplification of the procedures for certifying conformity in different countries.

11.6.2 Sales

The activity of this department is focused on product sales, performed primarily through the company's worldwide network of retailers. Major construction projects covered directly by Mapei represent approximately 20 % of total sales (half of which are ceramic tile adhesives). In these cases, the sales department collaborates with the technical assistance department to support customers in preparing specifications, and in discussing all sales details directly on site.

The sales department is also responsible for analyzing the market situation and monitoring variations to help meet customer needs, and to examine the products offered by competitors (this activity is undertaken in cooperation with the R&D function).

The main benefits resulting from the use of standards, as outlined by the departmental managers, are the same as indicated by the heads of technical assistance – although the impact perceived by sales is lower.

One point underlined by the sales department is that, in certain markets, the lack of an effective system of market surveillance capable of verifying the conformity of certain products delays the development of a quality-oriented culture.

Finally, the department underlined the important role played by the quality management system in improving customer relationship tasks, and particularly in better management of complaints.

11.6.3 Research and development (into ceramic tiles, cementitious adhesives and other underlayer products)

Centralized in Milan, the R&D department is responsible to the Mapei Group for :

- The development of new products, and improvement of existing products

- The definition of product specifications and testing
- The definition of raw material requirements and their approval
- The development of formulas used in production

In addition, R&D is involved in the certification of new products (CE marking, etc.).

Recently, the laboratory also introduced an important programme to determine the release of VOCs from products, thanks to air and test chambers which allow preliminary verification of conformity to standards, the definition of new testing methods, and the evaluation of existing methods/schemes (EN 13999, ISO 16000 – Parts 3 to 6).

Standards are considered very important by the R&D department. In line with the view of the technical assistance department, R&D believes that standards are essential in providing clear and objective information about product quality to markets and customers.

In more general terms, R&D confirmed that the use of product and testing standards had been embedded in Mapei's business processes and practices for a long time, and that while the company believes such standards to be helpful, it is difficult to assess their precise contribution.

Some specific advantages (in cost savings) were identified in relation to:

- The selection and testing of raw materials during the start-up of new manufacturing plants (standards bring clarity in the dialogue with suppliers, and reduce transaction costs)
- The development of new products (standards, and in particular international standards, enable greater reliance on laboratory testing, reduce the need for field trials, and support more efficient production scale-up).

11.6.4 Quality assurance

A quality management system was introduced by Mapei in 1994 and has been continually upgraded since. The system was initially focused on manufacturing, and was gradually extended to cover sales and marketing activities. It was then complemented by environmental and safety management systems, and combined into an integrated system. This integration of several management systems into a single corporate model and its certification by internationally recognized accreditation and certification bodies, is an important element of Mapei's business strategy.

This approach, through the harmonization of activities and corporate procedures, has significantly contributed to the internationalization of the company and its ability to target and serve new markets in an efficient and effective way.

The integrated management system has allowed Mapei to rationalize and replicate its business development model in different countries, based on a gradual "take-up" through the introduction of simple products, followed by an upgrading of the market by progressively widening the product range.

11.7 Selection of operational indicators to measure the impact of standards

As indicated in the previous section, product and testing standards have been embedded for a long time in Mapei's business processes and practices, and it was considered difficult to quantify their impact on specific company activities – especially in relation to cost reductions associated with operational improvements. The company does not have mechanisms in place to measure the impact of standards in a structured way. At this stage, any analysis should have been

performed through "what if" assumptions (assessing how different activities would be if standards were not available).

Bearing in mind that the perception of the most important benefits of standards related to their contribution to company growth – a perception shared by all those interviewed – it was decided to focus on two key indicators (as shown in **Table 2)** that could be clearly connected to the company's value drivers:

Value drivers	Operational indicators
Product innovation	Financial impact of the transition to a new generation of products of higher quality (a transition partly driven by standards)
Product quality and reliability	Contribution of Mapei's integrated management system to its international expansion
Customer service	
Health, safety and environmental protection	

Table 2 – Operational indicators used to assess the economic benefits of standards

The analysis regarding the first indicator ("Transition to a new generation of products") was restricted to the product line "Cementitious adhesives (type C adhesives) for ceramic tiles" on the Italian market. The analysis regarding the second indicator ("Contribution of Mapei's integrated management system") concerned the whole group.

11.8 Calculation of the economic benefits of standards

11.8.1 Transition to a new generation of higher quality products

In the last decade, sales of adhesives for higher quality ceramic tiles – the so called "improved concrete adhesives" (class C2, according to

ISO 13007) – have continually increased in comparison to the lower range "concrete adhesive with normal setting" (class C1) products.

Consequently the decade from 2002 to 2011 was chosen as the basis for quantifying the economic benefits of standards, along with two factors – the increase in profitability resulting from the changing mix of sales between class C2 and class C1 products, and the contribution of standards to the transition process.

The analysis was not straightforward due to the dynamics of the ceramic tile market, and this had to be factored in, as described below.

The sales trend in ceramic tiles was taken as a reference since there is a logical link between sales of ceramic tiles, and the sales of adhesives.

Figure 3 indicates that sales had grown moderately in the period 2002-2007, with a sharp decline from 2008-2011 due to the economic recession.

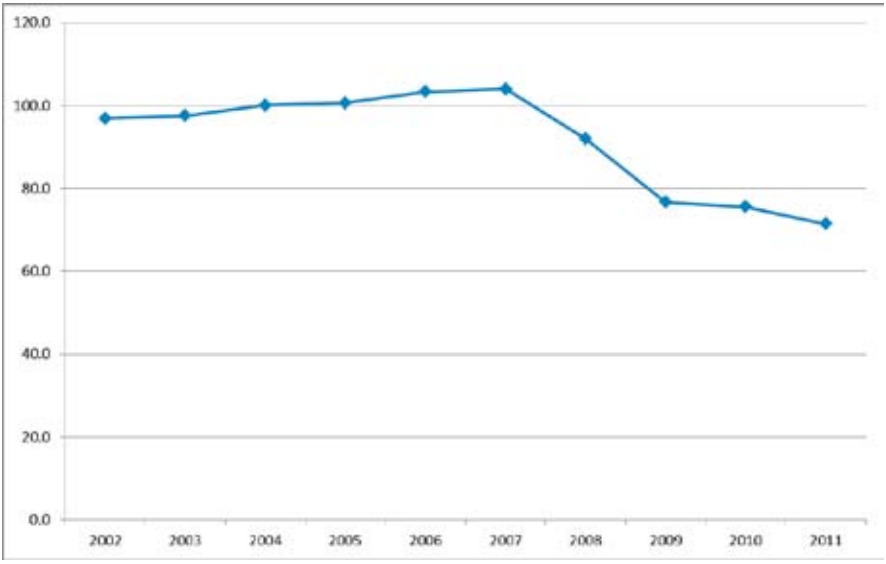

Figure 3 – Total sales of ceramic tiles in Italy

Over the same decade, Mapei's sales of adhesives for tiles (classes C1 and C2 combined) grew substantially during 2002-2007, declined between 2007 and 2009, and remained stable in 2010 and 2011. **Figure 4** compares the ceramic tile sales trend with that of Mapei's adhesives.

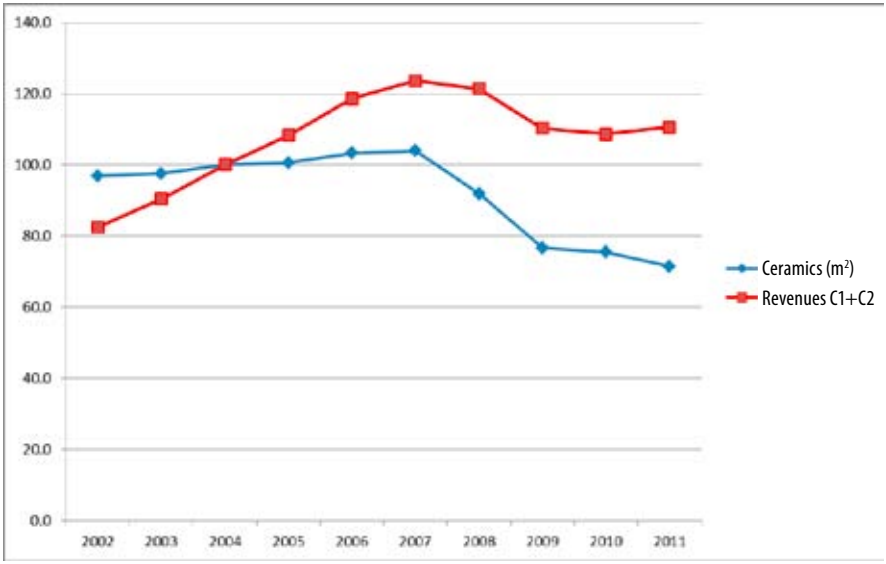

Figure 4 – Trends in sales of ceramic tiles and Mapei's class C1+C2 adhesives in Italy

The distribution of sales revenue between Mapei's class C1 and C2 adhesives product lines over the decade is shown in **Figure 5.**

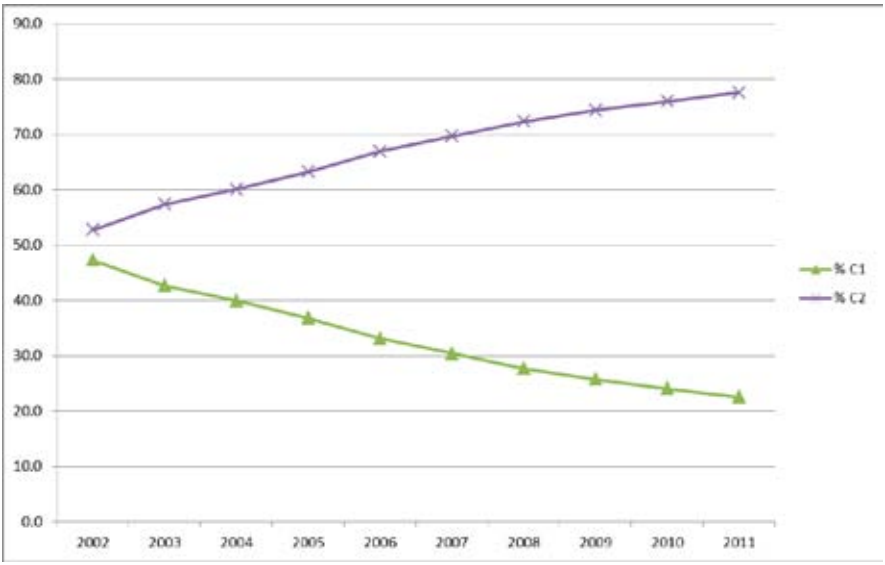

Figure 5 – Distribution of sales revenue between class C1 and C2 product lines (%)

Class C2 products have grown steadily from slightly over 50 % of the mix in 2002, to nearly 80 % in 2011.

Product standards and the European CE marking practice have contributed to disseminating clear and objective information on product performance, and have facilitated the transition toward higher quality products (which provide considerable user benefits in terms of ease and speed of installation and better handling of installations of different tile surfaces, including large format tiles).

By comparing the total sales of Mapei's adhesives with those of ceramic tiles, it is possible to evaluate the differential in relative annual growth. For the 10 year period analysed, this corresponds to an average annual differential equal to $\Delta m = 5.72\,\%$ (see **Figure 6)**.

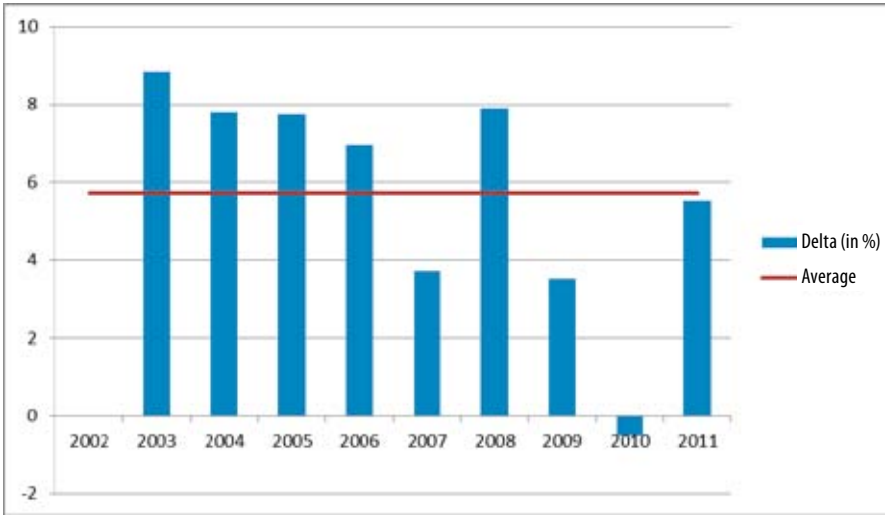

Figure 6 – Differential in sales growth between ceramic tiles and adhesives

Based on input provided by the Mapei managers interviewed (and taking a median value between the figures provided by those in charge of the departments concerned), it was estimated that technical product standards and CE marking have contributed about 35 % of this result. It is therefore possible to estimate that over the last 10 years standards have contributed to an annual growth equal to 5.72 × 0.35 = 2.002 % of total adhesives sales.

In the same period, Mapei's turnover in Italy increased from EUR 272 million in 2002 to EUR 510 million in 2011. The available financial and consolidated statements for the four years 2007-2010 indicate an average annual EBIT (earnings before interest and taxes – gross profit) equal to 9.3 %. Projecting this data across the whole decade, and considering that in the first five years the company achieved higher profitability, it is reasonable to assume a conservative overall average EBIT of 10 %.

The average annual turnover of ceramic tile adhesives over the same period was EUR 121.4 million. Assuming profitability for this product in line with the company's average profitability, its annual contribution to Mapei's EBIT would be about EUR 12 million. It is therefore possible to estimate that the use of technical product standards has contributed at least 12 × 2 % = 0.24 or EUR 240 000 per year directly to Mapei's EBIT in Italy.

In view of the fact that the average EBIT of the Mapei Group is nearly double that of Mapei Italy, the extrapolation of the previous estimate on a global scale would lead to a total contribution of standards to group EBIT of about EUR 480 000 per year.

11.8.2 Implementation of Mapei's integrated management system on a global scale

The Mapei strategy of internationalization is based on two fundamental objectives – proximity to local needs and reducing to a minimum the cost of transporting raw materials and finished products. Mapei aims at being as close as possible to its customers, and believes that it is a major strength to be able to understand the specific needs of customers from each country, and to trust local management and personnel.

As stated in section 11.6.4, the implementation of an integrated management system (covering quality/safety/environmental aspects) has been a core element of Mapei's strategy, facilitating the structuring and harmonizing of business processes with market growth objectives, and combining specific local requirements with knowledge and experience acquired on a global scale.

Mapei's senior managers believe that this approach has significantly contributed to Mapei's ability to target and serve new markets in an efficient and effective way.

Figure 7 highlights the correlation between the development of new plants and the number of certified Mapei subsidiaries, focusing on quality management systems based on ISO 9001 (the first standard implemented by Mapei, initially applied to manufacturing).

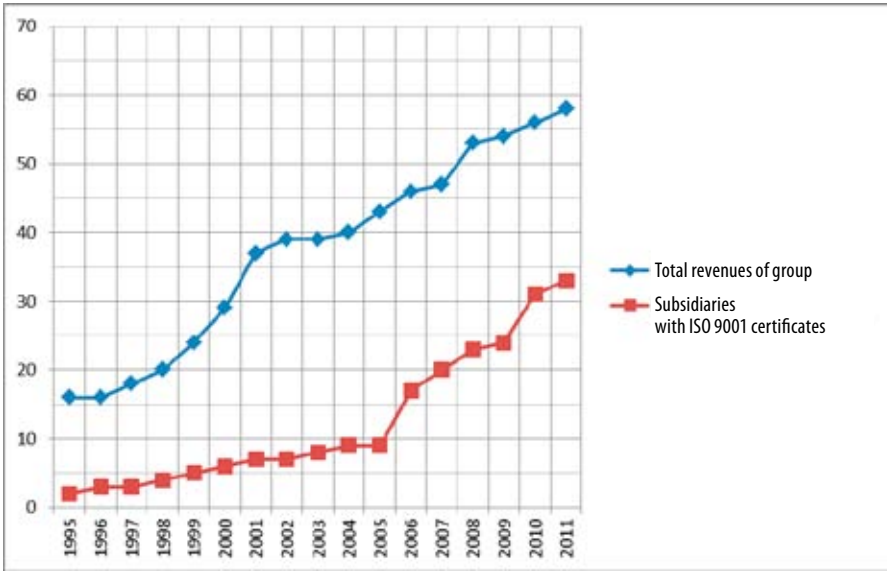

Figure 7 – Number of new Mapei manufacturing plants and ISO 9001 certifications worldwide

Mapei's management sees a causal correlation between the growth of its industrial plants globally, based on a certified quality management system, and the rapid sales growth achieved. Over the 10 years from 1995 to 2006, there has been a clear link between the number of group subsidiaries certified and total group turnover, as highlighted in **Figure 8.**

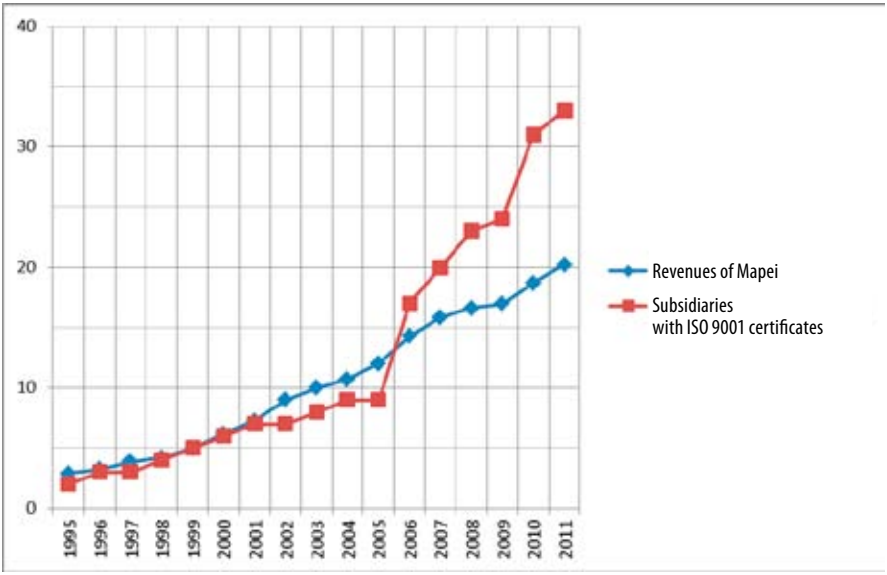

Figure 8 – Number of ISO 9001-certified Mapei subsidiaries and group revenue (×100 EUR million)

The Compound Annual Growth Rate (CAGR) of Mapei Group sales in the period 2002-2011 was 11 %, with an average annual turnover increase of about EUR 130 million. In the opinion of the senior managers interviewed, the company's management system has played a critical role in supporting group profitability and its rapid international expansion. The most conservative valuation has indicated the contribution of management system standards in the order of 20 %. On the basis of this valuation it is possible to estimate the contribution of standards to the growth in company turnover at about EUR 26 million per year.

According to consolidated balance statements, the average EBIT of the Mapei Group for the period 2007-2010 was equal to 6.3 % of total consolidated group turnover. Assuming conservatively the same figure for the whole decade, it is possible to make a rough estimate

that management system standards have contributed directly to the EBIT of the Mapei Group at a rate of EUR 1 638 000 per year (26 × 6.3 % = 1 638).

11.8.3 Summary of results

The conclusions reached under sections 11.8.2 and 11.8.3 take two different aspects into consideration. It is possible that there might be some overlap between the two contributions to company gross profit resulting in some double counting.

However, considering the very different nature of the contributions (in one case regarding a specific product sales dynamic, in the other a systemic process of international expansion), it is considered reasonable to ignore possible overlaps and combine the two impacts.

The final results are summarized in **Table 3.**

Operational indicators	EBIT impact (EUR)
Impact of the transition to a new generation of products of higher quality (a transition partly driven by standards)	480 000
Contribution of Mapei's integrated management system to its international expansion	1 638 000
Total impact	**2 118 000**
Impact as a % of Mapei Group EBIT (2010)	2.9 %
Impact as a % of Mapei Group consolidated sales (2010)	0.14 %

Table 3 – Summary of results

11.9 Qualitative and semi-quantitative considerations

Participation in standards development

The analysis has shown that Mapei places great importance on active participation in standards development. While quantitative benefits linked to such a participation are difficult to demonstrate, the company nevertheless clearly identifies important qualitative advantages.

According to Mapei, there are three key advantages of participation in standards development :

1. The possibility of influencing the content of standards in a direction coherent with the knowledge and good practices applied by the company, and of elevating the minimum level of performance/quality (based on reasonable compromises acceptable to the producers of the least expensive products). The definition of test methods with all the related details and implications represents a particularly important example
2. The opportunity to acquire better knowledge of the needs, behaviour and strategies of producers active in markets for which Mapei has limited experience
3. The possibility for laboratories participating in standards development to have immediate access to new test methods during the steps in the standards development process, thus reducing technological development cycles and time-to-market.

These advantages must always be balanced with the potential disadvantages of sharing company know-how with competitors (a particular sensitive issue for a market leader). However, the extensive experience acquired so far indicates a positive trade-off for Mapei.

Use of standards

In addition to the benefits quantified in Section 11.8, many other benefits resulting from the use of technical standards have been identified by the study, although they can only be described, at this stage, in qualitative terms. Some of the most important are summarized below by business function :

Research and development

Advantages provided by use of product and technical testing standards include :

- The selection and testing of raw materials during the start-up of new manufacturing plants – standards bring clarity in the dialogue with suppliers, and reduce transaction costs
- The development of new products – standards, and in particular international standards, enable greater reliance on laboratory testing, thus reducing the need for field trials, and support more efficient production scale-up.

Logistics

The application of management systems to the logistics chain has supported the rationalization of processes that have a direct influence on customer satisfaction and loyalty. For example, the implementation of environmental management systems has helped promote the use of rail transport, particularly which has reduced the loss of aluminous cement due to ruptured bags in transit.

The consistent application of continual improvement practices has helped to better control the loading and circulation of trucks, and reduce the time taken. Moreover, further improvements in scheduling have led to the effective management of lower volume shipments, helping dealers to reduce stocks without affecting delivery times.

Production

The optimization of processes and environmental management has led to a significant improvement in waste management at the Mediglia production unit close to Milan – the company's most important manufacturing plant.

To reduce the potential for nonconformities, the production process has been adapted to favour maximum recovery of powder products (easier to re-use than liquids), thus reducing the impact and cost of disposal operations. Similar measures have been taken to manage other waste materials, thus reducing the amounts for disposal, leading to economic benefits and increased environmental respect.

11.10 Evaluation of results

Mapei is a market leader with a long-standing tradition of interest and involvement in standardization.

The analysis has shown that:

- Standards are part of the company culture and are extensively used by many business functions. Their contribution to supporting operational efficiency is clearly recognized by the company, although, being part of consolidated business practices, is very difficult to quantify
- Standards are also perceived as strategic tools that support the company's business development. Today this seems to be the most important aspect for Mapei, and the main effort of the study has been dedicated to identifying specific examples of this kind, with a view to quantifying the direct economic benefits created by standards
- The active involvement in standards development is clearly related to the two items above – participation is indeed seen as a way

to strengthen technical and business knowledge, with a positive effect on operational efficiency and on the possibility of gaining competitive advantage.

The economic benefits of standards quantified by the study are significant, particularly considering that the analysis has been restricted to two business cases and that many impacts of standards identified by the study could not be quantified.

11.11 Conclusions

The outcome of the study confirms that standards have an impact on Mapei's value drivers:

- Product innovation
- Product quality and reliability
- Customer service
- Health, safety and environmental protection.

The economic value generated by standards in support of Mapei's business development has been estimated in relation to two specific business cases, resulting in a contribution of over EUR 2 million to group EBIT (about 3 % of the total group EBIT in 2010, corresponding to 0.14 % of consolidated group sales).

These results are encouraging and indicate that standards generate a direct economic benefit that is possible to quantify through dedicated analysis.

It is important to underline that it is difficult to determine precisely which part of a given impact is attributable to the use of standards as opposed to other factors. The results of the study are based on best estimates made by the persons interviewed (business managers and technical experts from the selected business functions), and on

assumptions and extrapolation made by authors of the report on the basis of official company data. A conservative approach has been followed, using lower or medium-end estimates.

The benefits that have been quantified relate to a very interesting and important role of standards for the company – how they support its business development. However, it is also important to recall that standards bring significant additional benefits, in most cases identified at a qualitative or semi-quantitative level.