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Gerfor, Colombia

" In memory of Mr. Fernando Aya Duarte, whose dedication and commitment to standardization outweigh the economic benefits identified in this study that resulted largely from his management and leadership in Gerfor "

8.1 Objectives and organization of the pilot project

8.1.1 General objective

To allow interested parties from the private and public sectors to appreciate the economic and social impact of standards, and raise the awareness of political and business leaders about the benefits of implementing such standards.

8.1.2 Specific objectives

- To understand the value of using standards in the organization, and the importance of participating in standardization activities
- To understand how standards affect the key processes of the organization's value chain
- To quantify the economic impact of standards in the organization.

8.2 Introduction to the selected company

8.2.1 Presentation and track-record of the company

Gerfor is a multinational Colombian company participating in the plastics and synthetic fibres sector of the petrochemicals industry, and a leader in the production and commercialization of PVC and CPVC piping and fittings. Its headquarters and manufacturing plant are located close to Bogotá, where it employs 850 people.

The company started operations in 1967, commercializing metal taps and fittings. By the end of the 70s Gerfor began manufacturing plastic taps and PVC fittings, and PVC piping in 1985. To fulfill its key

objective of customer satisfaction, the company has since developed a wide product portfolio in conformity with quality standards.

Today, Gerfor is a multinational company with a presence in several Latin American countries. It is focused on further expansion in Latin America as a starting point to extending coverage in world markets.

As a result of its ability to deliver high product quality, Gerfor is now the leading Colombian industrial group in the production and commercialization of:

- PVC and polyethylene piping and fittings for the construction and sewerage industries, plus aqueduct nets and telecommunication systems
- Plastic and metallic household taps
- PVC covers
- Solvent cement.

Gerfor's long tradition in developing and applying standards to improve competitiveness was a key reason for its participation in the pilot study. Having been involved in the development of technical standards for the piping sub-sector for more than twenty years, the company plays an active role as Chair of the Colombian technical committee for standardization of piping, ducts and plastic fittings and also participates in other technical committees. Gerfor is certified to ISO 9001, all production is based on product standards, and it has quality certifications for most of its pipe lines (see Section 8.3).

8.2.2   Role and position in the market

Gerfor is consolidating its position as a multinational company and has subsidiaries in much of Latin America, as indicated below:

- Centroamericana de PVC S.A., opened in 1998 in Guatemala to cover the Central American market
- Centroamericana PVC S.A. de C.V., opened in 2004 as a distribution centre for El Salvador
- Centroamericana de PVC S.A. de C.V., distribution center for Honduras
- P.V.C Gerfor Peru S.A.C, opened in 2010 to promote commercialization in South America
- Currently, 97 % of the company's sales are achieved in Colombia, where customers are grouped in three sectors : infrastructure, construction and irrigation, and 3 % abroad (Bolivia, Chile, Costa Rica, Ecuador, Guatemala, Honduras, Panamá, Puerto Rico, Salvador, Venezuela).

It holds about 26 % of the national market for its three product lines : 75 % of which is PVC pipes, 12 % taps and 12 % tiles.

The most important product line (PVC pipes and fittings) covers three main market segments : construction (45 % of sales), infrastructure (aqueduct and sewerage in governmental projects) (40 %) and irrigation (15 %). The latter is considered by Gerfor as the segment with highest potential. Annual income in 2009 was about USD 105 million.

8.3 Attitude of the company towards standardization

8.3.1 Attitude of Gerfor management and personnel towards standardization

Gerfor can be described as a leader in its attitude to standards. The company is a serious implementer of standards and contributes to their development through active participation in standardization

technical committees. The company is not simply an operational user of standards but derives strategic advantage from them, seeing standards as fundamental commercial tools to help gain access to markets.

Standards are part of the company's daily activities, with processes and personnel relying on them. They are applied daily by most of Gerfor's business functions, including notably procurement, engineering, production, and marketing and sales.

Gerfor is a member of ICONTEC Technical Committee 91, *Plastic piping, ducts and fittings*. This participation helps the company simplify the research and development of new products, pursue a better approach to customer service, interact with governmental entities, and take advantage of early access to information such as technical regulations.

It also participates in more than 10 technical committees developing standards for occupational health, industrial safety, ceramic and refractory construction products, geosynthetics, raw materials for the plastics industry, non-ferrous metals, and hydraulic and sanitary installations, among others.

8.3.2   Gerfor's experience in using standards to manage its business processes, suppliers and customers

Gerfor's experience in applying standards began with the implementation of product standards. Today, the company develops and certifies all its products in conformity with Colombian standards.

Pipe manufacture, commercialization and use are also governed by, and certified to, a number of technical regulations. Some of these regulations include references to standards for certification (10 in

total), which are referenced fully or partially (some requirements in the standards only) in the regulations.

In addition, the company is certified to Colombian quality management standard NTC-ISO 9002:1994, awarded by ICONTEC in 1998 in the scope of "Manufacturing and commercialization of PVC piping and fittings and household faucets. Manufacturing and commercialization of PVC solvent cement". Since then it has maintained certification through regular audits. Gerfor has also made the transition to the NTC-ISO 9001 versions.

Currently Gerfor is implementing NTC-ISO 14001:2004 and NTC-OHSAS 18001:2007, with the aim of certification.

These certifications have helped the company to compete in the construction, infrastructure and irrigation sectors, and position itself as a leader in the Colombian fluid management solutions market, by assuring that its products meet the highest quality levels.

8.4   Analysis of the value chain

8.4.1   Analysis of the value chain of the plastics and synthetic fibres sector

8.4.1.1   Identification of the value chain

Gerfor is part of the value chain of the plastics and synthetic fibres sector of the petrochemical industry. This chain covers a wide range of specializations from gas exploitation and crude oil refining to the production of basic petrochemical raw materials (aromatics and olefins), intermediates (polyethylene, polyvinyl chloride), polypropylene, resins, etc, and transformed and finished plastic goods. These finished

plastic products are destined for the infrastructure, construction and agriculture industries, and for end-uses such as automotive spare parts, toys and household goods.

The chain is characterized by differences in the production processes of companies operating in a highly competitive market composed mainly of small and medium enterprises. Most of this production is aimed at the domestic and retail market with little involvement in standardization. The leading companies, on the contrary, have a proactive attitude toward standards, because they help to open doors to foreign markets and to strategic industries such as construction and agriculture.

8.4.1.2   Balance of trade in the plastics and synthetic fibres sector

The main destinations of Colombian plastic product exports between 2007 and 2009 were the Andean Community, the Central American Common Market, Chile, the European Union, Mexico, Panama, USA, Venezuela and special tax regime zones in Colombia.

Of these, the top importers were Venezuela with a 31.8 % share in 2007, 30.2 % in 2008 and 26.4 % in 2009 ; the Andean Community with 16.2 % in 2007, 18.4 % in 2008 and 19.8 % in 2009 ; and the USA with 14.7 % in 2007, 13.2 % in 2008 and 12.8 % in 2009. (See **Figure 1)**.
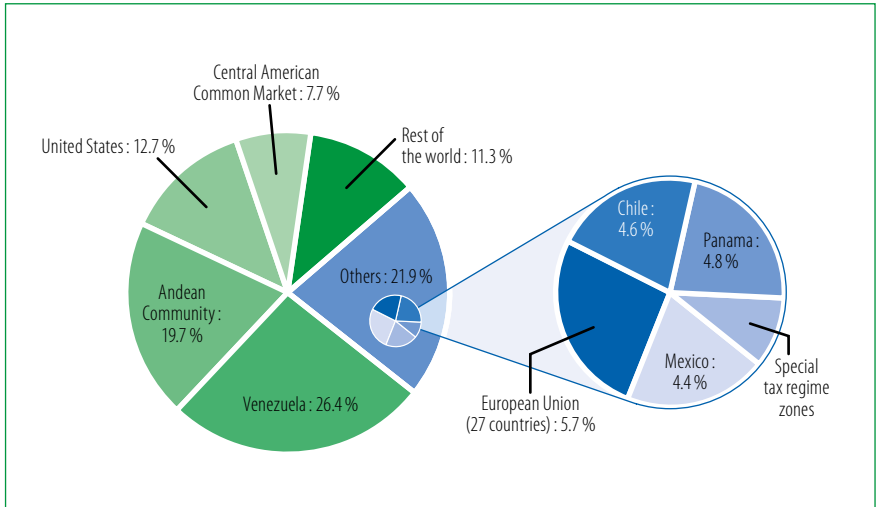
Fuente : DANE – Acoplasticos

Figure 1 Destination of Colombian plastic product exports in 2009

These figures highlight the importance of the regional markets in Latin America and Caribbean, which represent 73.7 % of total exports of basic chemicals, 81.6 % of other chemicals, 92 % of synthetic and artificial fibres, 69 % of plastic products, 90 % of woven textiles, 87 % of footwear, and 75 % of electrically insulated cables.

8.4.2   Analysis of the company value chain

To analyze the Gerfor value chain we used the traditional model with nine business functions, taken from the research methodology, but adapted to the company's processes based on field interviews. Basic functions in relation to these processes are shown in **Figure 2.**

A Direction and management	Direction, Planing and improvement, Internal Quality Audit - IQA, Client service				
B R&D / Engineering	Development of finished product, Development of raw materials				
C Procurement	National purchases, International purchases, Dealers				
	Raw materials conformity	Mixes Extrusion Injection Recovered Welding	Conformity of finished product, Store Management, Delivery of finished product	Marketing Sales	Technical assistance
	D Logistics (input)	E Operations	F Logistics (output)	G Marketing and sales	H Services

Source : ICONTEC-USTA pilot project team

Figure 2 Gerfor's value chain

8.4.3 Value drivers

Gerfor's value drivers are :

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

They are related to the company's strategy which is based on selling exclusively through indirect sales channels, supported by high quality products at competitive prices and a higher level of service than competitors.

8.5 Scope of the assessment

The business functions in GERFOR's value chain included in this assessment are those which combine significant use of technical

standards with high correlation with the company's value drivers, i.e. Production and Marketing and Sales.

Additionally, interviews have been organized with staff from the following business functions: Direction and Administration, Research and Development, Procurement, Inbound Logistics, Outbound Logistics. For these functions, interesting qualitative and semi-quantitative considerations about the impact of standards have been derived and are presented under section 8.9.

8.6   Use of standards in the company value chain

More than 200 standards are used by Gerfor. A list was prepared correlating each standard to the business functions identified in the value chain, to assess the economic contribution to each function.

8.7   Selection of operational indicators to measure the impact of standards

The operational indicators selected to measure the impact of standards are shown in **Table 1** describing:
- The business functions selected within the scope of the assessment
- The value drivers applied to each function
- The impacts of standards on the activities in the business functions
- The operational indicators used to measure the impacts of the standards and their definition
- The financial impacts of standards (in USD).

Data on the impact of standards were collected directly by Gerfor managers and directors, calculated on the basis of the operational indicators available in the organization.

Business function	Value drivers	Impact of standards on activities	Operational indicators	Indicator result (USD)	Gross profit (USD) 2010	% EBIT	Value in USD
Operations	Perceived product quality Production capacity Process efficiency	Better quality management : process improvement in product lines where quality management practices have been implemented based on standards.	Operation control : Reduction in excess weight due to process quality management. Variation in USD between 2009 and 2010.	1 328 650	14 369 164	9,25 %	1 328 650
Marketing and sales	Distribution channels Customer service	Higher sales due to customer trust in standardized products and services. Standards enable access to more demanding markets (construction companies, etc.).	Sales derived from contracts for which compliance with standards was not obligatory but was considered essential to gain the sale. (Especially ISO 9001).	33 267 042 (i.e. 47 % of total sales)	14 369 164	47 %	6 723 269
						56,25 %	8 051 919

Note : For simplicity, a fixed gross profit ratio is assumed – therefore, 47 % of sales generate 47 % of the company's EBIT

Table 1 Operational indicators to measure the impact of standards

8.8 Calculation of the economic benefits of standards

8.8.1 Calculation of the indicator " operation control – overweight "

Gerfor's production process indicators (consolidated every month), were taken as the basis for calculation. Data analyzed correspond to the annual overweight average in kilograms.

These values were multiplied by the average value of raw material for 2010 in order to obtain a standardized monetary value for comparison. The difference between 2009 and 2010 was then determined, observing cost savings due to the reduction in the overweight average value. According to company experts, the reduction is attributable to operations improvement derived from its ISO 9001-based quality management system. This value was then expressed as a percentage of the company's EBIT.

8.8.2 Calculation of the sales indicator

In the marketing and sales function, company experts estimated that 47 % of the total sales revenue were sales derived from contracts for which compliance with standards (especially, ISO 9001) was not compulsory but considered essential to win the sale. The critical role of standards' compliance to gain contracts was confirmed by several managers of the company, also from other business functions.

Assuming a constant gross profit ratio for the company (which is the most reasonable assumption and justified by the fact that there are no particular differences in the product mix and profitability of contracts for which standards' compliance is essential), 47% of sales generate 47% of the company's EBIT, i.e. 6.723.269 USD.

8.9 Qualitative and semi-quantitative considerations

There were examples of Gerfor's business functions where benefits derived from using standards were found, but where it was not possible to obtain the detailed data needed to perform the quantitative economic analysis. For this reason they are included as qualitative or semi-quantitative examples identified within the frame of the economic benefits of standards.

8.9.1 Research and development/engineering

a) Design of new products – " piping for irrigation "

Gerfor experts estimate that without standards product design would take **10** times longer than average, and the corresponding cost **would be five** times higher.

Using basic figures for the design function (annual labour costs of USD 300 000 and approximately 90 projects per year), equates to an average monthly labour cost per project of USD **3 333**. A project requiring 10 times more work generates labour costs of **USD 33 333** (and also possible higher cost for equipment and services, although this was not determined).

Additionally, a higher number of projects based on customized specifications would also have a major impact on the use of the available resources at Gerfor : Currently Gerfor runs 90 projects, but would only be able to operate 9 projects with the current resources if they were based on completely customized specifications.

b) Plastic tiles – waste

The development of improvement plans within the requirements of the company's ISO 9001-based quality management system has

yielded significant savings. An example was the plastic tile production process where a reduction in waste from 15 % to 3 % was achieved thanks to redesign. This generated a production increase from 220 Kg/h to 440 Kg/h.

8.9.2 Procurement – inbound logistics / Conformity of raw material and consumables

Gerfor divides its purchases into two groups : raw materials and consumables. The former are those with higher volume and value and, in general, are backed by standards supporting procurement.

Consumables, on the other hand, are purchased in lower volumes, represent only 5 % of the total cost of goods, and generally are not supported by standards.

Through interviews it was determined that 60 % of the total review time was dedicated to consumables and 40 % to raw materials.

The reasons why the verification of consumables requires more resources are :

- Product specifications are written with little or no initial information, so more time is required for investigation
- More time is required for interaction with suppliers (to clarify requirements)
- Products need to be tested because general test protocols are missing.

This gives an idea of the labour savings when standardized supplies are ordered. In the next example, the inspection times needed for PVC resin, with and without standards, are compared :

PVC resin inspection.

Estimated time : comparison of the certificate with the specification :
15 minutes

Without using standards : the raw material inspector removes a sample from each lot received and carries out the analysis to verify the conformity of raw materials.

Estimated time :
1. Analysis of the K value : **2 hours**
2. Analysis of volatile material : **1 hour and 30 minutes**
3. Apparent density : **30 minutes**

Total inspection time using a standard : 15 minutes

Total inspection time without using a standard : 4 hours

Labour cost for inspection using a standard : USD 0.57

Labour cost for inspection without using a standard : USD 9

Review of consumables and raw materials without standards generates a labour cost overrun.

8.9.3 Production

Scrap

Based on the production indicators for 2009 and 2010 related to the average percentage of scrap, it could be deduced that the results were practically the same from one period to another in spite of the increase in product lines. The results of the scrap indicators for each year are shown below :

	2009	2010	Variation
Scrap	21,52 %	21,65 %	0,60 %

Table 2 Percentage of scrap

8.10 Conclusions

8.10.1 General conclusions

- This study confirmed that standards are part of the company's daily activities, and that processes and personnel rely on them. Standards are applied daily to most of Gerfor's business functions, notably procurement, engineering, production, marketing and sales.

- However, the strategic value of standards to the company is derived from the **continual improvement of operations** and, above all, **the essential contribution to sales and market access**. Compliance to standards is often essential to close deals, and constitutes an element of competitive advantage for Gerfor.

- Specifically, the economic contribution of standards to the EBIT is 56,25 %, equivalent to USD 8 051 919 in 2010 – this also represents 7,7 % of total company turnover.

- In processes such as product design and development, non-availability of standards at the beginning of the process may generate cost overheads of five times the average for the activity, and up to 10 times increase in time. Similarly, in activities related to the inspection of raw materials and consumables, it was found that time used to verify non-standardized products was about 60 % of the total time, simply as a result of the lack of standards.

- In view of the fact that Gerfor has applied standards since the beginning, it is difficult to establish a baseline period without standards against which to measure and identify any benefits accruing from their use.

- Significant impacts from applying standards were seen in some of the company's activities which could not be quantified due to

the lack of data. Therefore, this information was only reported at qualitative or semi-quantitative level.

8.10.2   Key recommendations for next steps in using the methodology

- It is essential to present the detailed methodology and its stages and objectives to project leaders in selected organizations so that they can organize information and guide data collection better.

- Supplementary information should be added to the description of the value chain methodology to simplify identification of the organization's activities.

- The methodology should also include basic guidance and an example of a previous study, to help the organization decide which information will be required to make information collection or early preparation easier. It should also include a list of the minimum prior information required for the interview stage. Likewise, to aid interview coordination, it would help if questionnaires were sent in advance so that interviewees are well prepared, and can identify any problems before starting.

- The methodology should indicate how to consider and analyze data during periods in which significant organizational changes occur.

- The report should include the impact map of standards and their prioritization since this is fundamental to the direct relation between impacts and standards.

- In order to simplify the understanding and application of the methodology, ISO should consider translation of the final version and its application tools into other languages of significant use in developing countries (for example, Arabic and Spanish), where there is urgent need to create awareness of the importance of standards.

- Even though the methodology helps to determine the economic benefits of standards, it will only be useful if there is a strong measurement culture in the organizations studied.
- The methodology and experience gained should be used to develop a guideline standard to measure the economic benefits of standards (regardless of whether it applies to management, products or testing), similar to NTC-ISO 10014:2006, *Quality management – Guidelines for realizing financial and economic benefits*.
- The methodology starts from the premise that the application of standards generates a positive economic benefit, which is not necessarily true. In many cases it is more economical to produce without quality than with quality. The methodology should present information related to the treatment of such cases.
- In cases where cost overruns are generated as a result of not using standards, and are identified and controlled by the organization, it is often not possible to assign an EBIT percentage to these values. They should simply be reported as semi-quantitative cases.
- Project teams should include a representative of the financial department to support data collection and interpretation.