[study]

THE ECONOMIC IMPACT OF STANDARDIZATION

TECHNOLOGICAL CHANGE, STANDARDS GROWTH IN FRANCE

JUNE, 2009

afnor NORMALISATION

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Author

Hakima MIOTTI
Marketing and Innovation Department – AFNOR Group

THE MARKETING AND INNOVATION DEPARTMENT'S STUDY GROUP CONSISTS OF FOUR EXPERTS WHOSE MISSION IS TO CONTRIBUTE TOWARDS BETTER COMPREHENSION OF THE MECHANISMS OF THE MARKETS ON WHICH THE AFNOR GROUP OPERATES. OVER 30 QUALITATIVE AND QUANTITATIVE STUDIES ARE CONDUCTED EACH YEAR.

SUMMARY

« Standardization: a powerful economic lever »

AFNOR's study is the first of its kind to observe the impact of standardization in two dimensions.

From a macroeconomic standpoint, standardization directly contributes to the growth in the French economy. Standardization contributes an average of **0.81% per year, or almost 25% of GDP growth.** This is in line with figures for other technological leading countries, such as Germany and the United Kingdom.

The second of these dimensions is microeconomics. And this is precisely what makes this study unique. This is an in-depth **survey** of **1,790 companies or organizations** of all sizes and from all sectors of activity, irrespective of whether or not they are involved in the standardization process. It knocks several generally accepted ideas on the head, such as the cost of standardization.

Over 66% of the companies interviewed stated that standardization contributes to the **generation of profits,** proving that it has a positive impact on a company's value.

Another generally accepted idea is swept aside by this study: it is not just the large corporations, capable of mobilizing considerable resources in the standardization process, which consider voluntary standards beneficial for their activities; smaller structures such as **SMEs with 250 employees** or less also found them beneficial. Thus, **69.3%** of companies consider standardization to have a positive impact on their activity.

Given the current state of the economic markets, this study provides a timely demonstration to support French companies becoming more and more involved in voluntary standards work.

« Aiding innovation, conveying knowledge: two growth factors supported by standardization »

In France, the growth of productivity and its corollary, an increase in GDP, are currently determined not only by standard production factors like labour, capital and natural resources, but also by the level of education, innovation, demands for patents and the volume of R&D activity.

In mature economies like France, where technological improvement constitutes the main source of growth, standardization contributes directly to pushing back technological frontiers, thereby benefitting the greatest number of people. Just like patents, voluntary standards are a way of codifying knowledge. Standards work in tandem with innovation, and are also a means of disseminating it, since they enable companies to share innovation while at the same time developing good market practices.

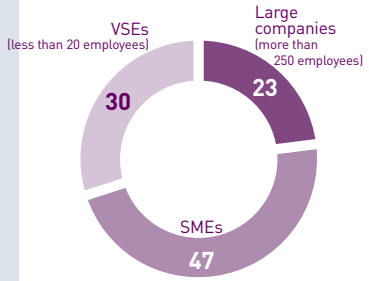
When standardization has been clearly identified as an investment at corporate level, it has often contributed to creating corporate wealth. Most of those interviewed consider standardization to be a powerful economic lever. This study fully supports the adage that "whoever sets the standard also makes the market". 71.2% of respondents found that participating in standardization enabled them to anticipate future market requirements in their own particular sector. 61.6% of respondents said that investing in standardization was an efficient strategy for promoting their interests at both European and international levels.

The study confirmed the acknowledged benefits of standards: product interoperability, increased productivity, market share gains, and improved interaction with public R&D institutions. In addition to these traditionally recognized benefits, 5 major lessons emerge from this study:

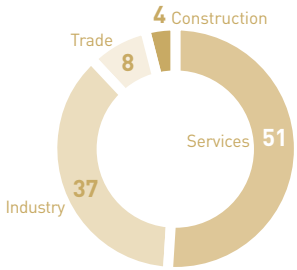
- **Company value enhancement.** When 70% of those interviewed stated that voluntary standards contribute to enhancing their company value, they were not simply referring to brand image. They were referring to standardization as an economic asset. The knowledge capital contributed by corporate involvement in standardization work represents true value.
- **Innovation.** Standardization not only promotes the dissemination of innovation without revealing a company's manufacturing or technological secrets; it also renews the interest for a product. 63% of respondents favoured this approach, saying that voluntary standards made it possible to better differentiate products. Standardization is a selective tool.
- **Transparency and ethics.** 61% maintained that standards contributed to improved compliance with competition rules, and 56% approved of their voluntary nature, which facilitates collaboration with other stakeholders. Standardization establishes the rules of the game, making it possible to eliminate players who fail to comply.
- **International.** 90% of standards are European or international in origin. 70% of companies surveyed found that they provide a genuine advantage for developing international exchanges. 46% of companies actually found that standards enabled them to increase their export capacity. Standardization constitutes a genuine passport when it comes to exports.
- **Product and service quality.** Standardization is a true guarantee of quality. 74% confirm that standardization gives them greater control over safety-related problems, and 79% say that it helps optimize compliance with regulations.

THE SAMPLE: 1,790 RESPONDENTS

Breakdown by size, in %



Breakdown by sector, in %



47% do not participate in standardization work.
60.5% of companies are owner-managed.

« Standardization, an industrial project like any other »

In mature economies like France, where technological advances constitute the principal source of growth, standardization contributes directly to improving GDP at the rate of over € 5 billion per year on average.

At a corporate level, the impact of standardization is clearly perceived as an advantage. A general trend of integrating standardization into top-level corporate strategy is beginning to take shape. Thus, investment in voluntary standards is an industrial project like any other, involving risk-taking which will be expected to generate profit for the company.

INTRODUCTION

The dissemination of technological and other forms of knowledge is an essential process for enhancing economic performance. A study of the existing literature on the contributions to growth and on the roots of business competitiveness tends to general consensus: it is the volume of knowledge, its dissemination and its vitality that ultimately determine the long-term growth of more mature economies. Thus P. Aghion and E. Cohen[1] offer the hypothesis that the supposedly ill-adapted structures of French industry are due to a shift from a "catching up" economy, in which gains in productivity are achieved mainly by imitating technology of the countries that are technological leaders (the United States in particular), to a "leading-edge" economy, which has reached the world's "technology frontier" and in so doing has exhausted the earlier opportunities for productivity gains:

> *"Intuition suggests that for a country that is far from the technology frontier, gains in productivity are made mainly by imitating existing technology, whereas for a country close to the technology frontier, innovation tends to become the main driver of growth."*

We can assume that standards, as a source of codified knowledge, are also an important vehicle for this dissemination process, but their contribution to macroeconomic performance has been relatively under-researched. Most work has focused on analysing processes based on more sophisticated forms of knowledge: R&D, innovation and patents, and much less on the benefits of standardization.

AFNOR, as a central operator in the French system of standardization, and as the French representative in Europe (CEN) and internationally (ISO), launched a study into the economic impact of standardization as part of its "Standardization 2010" strategy. The main aim of this study was to measure the effects of voluntary standards on economic activity and thereby fill in some of the gaps in the research mentioned above.

This report is divided into two sections:

A macroeconomic analysis, the aim of which is to measure the relationship between standards and long-term growth, using an approach first used in Germany (1999) and later adopted with some variations in the United Kingdom (2005), Australia (2007) and Canada (2007).

The second part of the study consists of an analysis of the perceptions of various companies regarding the impact of standardization. This section provides a complementary point of view to the macroeconomic analysis. While certain results may appear contradictory, they also reflect the ongoing discussions between the overall benefits and private costs of research (investments in R&D and in innovation).

1 Aghion, P. and Cohen, E. (2004), "Education et Croissance", Rapport du CAE, Paris, La Documentation Française.

1 // TECHNOLOGICAL CHANGE, STANDARDS AND GROWTH IN FRANCE

Economic growth (increase in GDP or GDP per capita) depends on both the use of different production factors (natural resources, work, capital) and the efficiency with which these different factors are used. Growth increases when more work, more land and more capital are used. However, in any economy there is a limit to the accumulation of these factors, i.e. how far they can be increased. Typical limits are the ageing of the population, the depletion of natural resources, or the impossibility of pushing back agricultural frontiers any further (lack of new productive land).

Growth should also increase if productivity, i.e. the efficiency with which the different production factors are used, increases. Total factor productivity (TFP) is a measure of the volume produced by a given level of use of all the factors. An increase in TFP means that we obtain more production for a given set of resources used. So what determines the growth of total factor productivity? An array of variables including level of education, volume of R&D and innovation and, probably, standardization.

1.1 THE MACROECONOMIC APPROACH: THE BASIC MODEL

In traditional growth models, growth depends on the pace of productive capital accumulation, employment trends and the rate of accumulation of knowledge.

The model used here is described by the traditional Cobb-Douglas equation:

$$Y_t = A_t L_t^{\alpha} K_t^{(1-\alpha)}$$

where Y is production, K capital input, L labour input and A total factor productivity (TFP), which measures the proportion of productivity not accounted for by the contribution of production factors. Assuming freely competing markets, the variables α and (1 - α) stand for the respective proportions of wages and profits in the value added.

Taking the logarithms of the equation, we obtain:

$$\ln(Y_t) = \ln(A_t) + \alpha \ln(L_t) + (1-\alpha) \ln(K_t)$$

Indicating logarithms in lower-case letters and differentiating with respect to time, we can write:

$$\frac{\partial y}{\partial t} = \frac{\partial a}{\partial t} + \alpha \frac{\partial l}{\partial t} + (1-\alpha) \frac{\partial k}{\partial t}$$

And

$$\frac{\partial y}{\partial t}=\frac{1}{Y}\frac{\Delta Y}{\Delta t};\frac{\partial a}{\partial t}=\frac{1}{A}\frac{\Delta A}{\Delta t};\frac{\partial l}{\partial t}=\frac{1}{L}\frac{\Delta L}{\Delta t};\frac{\partial k}{\partial t}=\frac{1}{K}\frac{\Delta K}{\Delta t}$$

And we obtain

$$\dot{y}=\dot{a}+\alpha\dot{l}+(1-\alpha)\dot{k}$$

This equation expresses the rate of growth of the economy in terms of growth in technical progress *(total factor productivity)* and variations in labour and capital input.

From this equation, we can deduce the *labour productivity* equation:

$$(\dot{y}-\dot{l})=\dot{a}+\alpha\dot{l}-\dot{l}+(1-\alpha)\dot{k}$$

We find

$$(\dot{y}-\dot{l})=\dot{a}+(1-\alpha)(\dot{k}-\dot{l})$$

which expresses the growth rate of productivity of work in terms of technical progress growth and the variation of capitalistic intensity weighted by the proportion of profits in the value added.

1.2 › MEASURING THE IMPACT OF STANDARDIZATION

To measure the impact of standardization on the economy, the work of the Canadian Council of Standards (2007) and the DTI in the UK (2005) has focused (from a macroeconomic point of view) on the effects of the stock of standards and its evolution on the productivity of work. The approach used here concentrates on the "opening" of the *black box* of total factor productivity (TFP).

For this purpose, the TFP is calculated and the following equation written:

$$\dot{TFP}_t=c+d\,\dot{knor}_t+e\,\dot{kbrev}_{t-2}+\sum_i^n f_i\dot{x}_t+\varepsilon_t$$

Thus the growth of technical progress can be explained by the vitality of the portfolio of standards *(knor),* and of scientific and technological knowledge *(kbrev)* and other factors.

The hypothesis resulting from this analysis is that there is a close relationship between innovation and technical progress and their dissemination, and that this dissemination can be proxied by the activity of standardization. In other words, standardization (standards, technical documents, etc.) can be considered *as a specific form of technology transfer.*

1.3 DATA

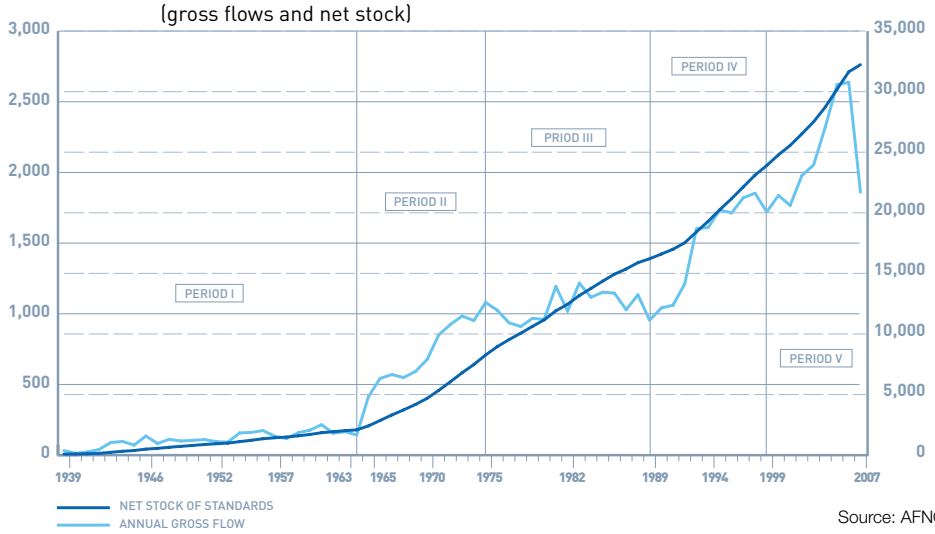
The data used for the macroeconomic analysis are the total GDP (in millions of euros), the working population as defined by the National Accounts (in thousands of persons), the total capital input in the economy (in millions of euros), the net portfolio of standards and the proportion of wages in Added Value (in %). The variation in the applications for patents made by French inventors to the INPI (Institut National de la Propriété Industrielle) and the EPO (European Patent Office) is also used. The portfolio of scientific and technological knowledge is proxied by the accumulation of patent applications over 20 years (the legal duration of a patent's validity). This variable lags behind by 2 years because of the time necessary to validate applications.

A key variable for the analysis is the portfolio of standards. To construct this variable we took the number of standards published per year and cumulated them.

However, standards have a useful life, and so we have to subtract those that are no longer applicable (either because they have been superseded, or because they have become technically obsolete). In this way we opted to amortize the stock of standards at a rate close to that used for the depreciation of physical capital input up to 1980. From then on, we used available net data.

Graph 1 shows the variation of the cumulated stock of standards and of the annual gross flow of publications from 1939 to 2007.

GRAPH 1 / EVOLUTION IN NUMBER OF STANDARDS PUBLISHED
(gross flows and net stock)



Source: AFNOR data

The variation of standardization activities falls into five major periods. Period I (1939-1963) was characterized by a slow and steady evolution in the stock of standards. Period II (1964-1975) witnessed an explosion in the process of production of standards that lasted until 1975. Period III was characterized by a relative stability in publication, of approximately 1,100 standards per year. A second acceleration occurred in 1989 (Period IV) and a third began in 1999 (Period V). This last period also witnessed a brutal drop in standardization activity in 2007, mainly due to a sharp decrease in the adoption of European standards. The annual flow of standards can vary considerably due to factors such as the publication of a European Directive or of a new development in the standardisation processes. Thus, the peak noted in 2005-2006 is due to the publication of standards connected with the Construction Products Directive (CPD) and to the setting of a new timeline objective of drafting standards within 3 years. This increased the availability of standards under development. The fact of reasoning in stock smoothes these effects.

1.4 › CALCULATED IMPACT OF STANDARDIZATION ON TOTAL FACTOR PRODUCTIVITY

The result of the estimation given by the equation for the impact of the variation in the portfolio of standards is given in **table 1.**

TABLE 1 / ECONOMETRIC ESTIMATION OF THE IMPACT OF STANDARDS ON THE TFP

MCO - robust		Coef.	Std. Err.	t	P>t
Constant		0.007	0.010	0.680	0.500
Change in stock of standards		0.120	0.059	2.040	0.047
Change in stock of patents		0.365	0.134	2.730	0.009
Crises	*1960*	0.030	0.004	7.600	0.000
	1964	0.032	0.004	7.410	0.000
	1974	- 0.034	0.002	- 17.800	0.000
	1975	- 0.043	0.002	- 20.940	0.000
	1993	- 0.016	0.002	- 8.610	0.000
	2001	- 0.018	0.003	- 5.740	0.000
	2003	- 0.008	0.003	- 2.420	0.020
Trends		0.000	0.000	- 1.980	0.053
R-squared		0.7794			
Number of observations		57			

The elasticity coefficient of 0.12, indicating that a positive variation in the stock of standards of 1% induces an increase of 0.12% in the growth of the TFP, is lower than that associated with the stock of patents (0.365). We note that both elasticities are very close to those found by Blind and Jungmittag for Germany[2] (calculated for 12 industrial sectors).

Using the econometric results, we can estimate the overall impact on total factor productivity. **Table 2** gives the results of estimations per period segment and for the whole period considered (1950-2007).

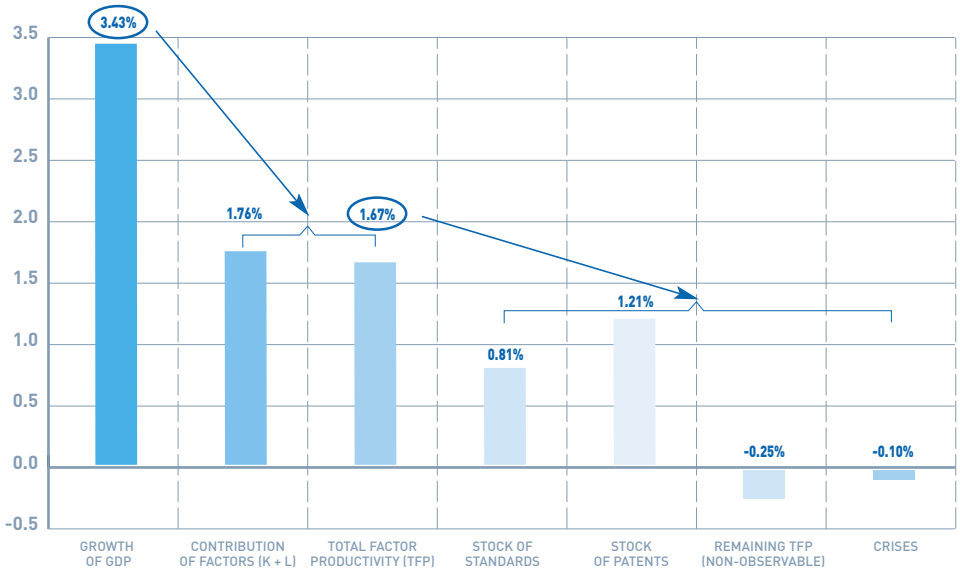
2
DTI (2005)
"The Empirical Economics of Standards".

TABLE 2 / IMPACT OF STANDARDS ON TFP

	Growth of GDP 1 = 2 + 3	Contribution of factors (K + L) 2	Total factor productivity (TFP) 3 = 4 + 5 + 6 + 7	Stock of standards 4	Stock of patents 5	Remaining TFP (non-observable) 6	Crises 7
1950-1973	5.3%	1.6%	3.6%	1.1%	1.9%	0.4%	0.3%
1974-1982	2.4%	2.4%	0.0%	0.8%	0.9%	- 0.8%	- 0.9%
1983-1993	2.0%	1.4%	0.6%	0.5%	0.6%	- 0.4%	- 0.1%
1994-2007	2.2%	1.9%	0.3%	0.5%	0.7%	- 0.8%	- 0.2%
1950-2007	**3.43%**	**1.76%**	**1.67%**	**0.81%**	**1.21%**	**- 0.25%**	**- 0.10%**

The impact of standards for the period 1950-2007 on TFP (and consequently on the total growth of the French economy) is 0.81% per year on average.

GRAPH 2 / THE IMPACT OF STANDARDS ON GROWTH IN FRANCE
(yearly average)



L: Capital input
K: Labour input
TFP: Total factor productivity

However, the impact *has not been uniform* throughout this period. Thus, during the *« 30-year post-war boom »* and in particular after a period of strong expansion of AFNOR (1964), the contribution of standardization to overall growth in France was very high, about 1.1% per year on average. At the same time the TFP (excluding standardization) was very lively. Thus the growth of the French economy was very strong and progressed at unprecedented rates. The following period, between the oil crises, showed a notable slowing of overall growth, and the contribution of standardization barely managed to offset downturns.

The period starting in 1983 and ending with the EMS crisis, which was a result of German reunification, was characterized by stable growth at relatively low levels. It was the lower accumulation of capital and above all of labour that accounts for this effect. The final sub-period witnessed a renewed contribution of the traditional growth factors and a recovery of the contribution of knowledge (measured by the numbers of patent applications). This is not surprising if we consider this sub-period as one in which the "new economy" dominated.

1.5 › A DETAILED COMPARISON WITH THE DIN ESTIMATIONS

If we compare the results for France and Germany (Table 3), the contributions are very similar. Thus the contribution of standards to the growth of the economy is 0.93% for France and 0.90% for Germany (before reunification[3]). The only difference lies in the fact that the German analysis broke TFP down into components other than the stocks of standards and patents (licenses). Here we used the residues to calculate the contribution of the factors omitted (excluding crises and the trend).

3
See Knut Blind, Hariolf Grupp, and Andre Jungmittag (2000): *"The Influence of Innovation and Standardization on the Macroeconomic Development in Germany"*. Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, project financed by the *German Institute for Standardization and the German Federal Ministry for Economic Affairs and Technology.*

TABLE 3 / GERMANY AND FRANCE: GROWTH BROKEN DOWN BY IMPACT OF FACTORS

Impact	Germany 1960-1990	France 1960-1990	France 1950-2007
GDP	**3.30%**	**4.01%**	**3.43%**
Capital input	*1.60%*	*1.75%*	*1.52%*
Labour Input	*0.20%*	*0.25%*	*0.24%*
Contribution of factors	**1.80%**	**2.00%**	**1.76%**
Contribution of standards	**0.90%**	**0.93%**	**0.81%**
Contribution of patents	**0.10%**	**1.23%**	**1.21%**
Contribution of licences	**0.50%**		
Contribution of remaining TFP		**- 0.16%**	**- 0.35%**

Source: Knut Blind, Hariolf Grupp, and Andre Jungmittag (2000), "The Influence of Innovation and Standardization on the Macroeconomic Development in Germany" and their calculations.

Table 3 shows that, with exception of patents, the contribution by various factors to growth remains very similar for Germany and France. These results are based on econometric calculations that confirm similarities of behaviour (Table 4).

TABLE 4 / COMPARISON OF ECONOMETRIC RESULTS

Elasticities	Germany 1960-1990	France 1950-2007
Elasticity of Capital	**0.361**	**0.363**
Elasticity of Labour	**0.639**	**0.637**
Contribution of factors	*1.00*	*1.00*
Elasticity of stock of standards	**0.070**	**0.120**
Elasticity of stock of patents	**0.127**	**0.365**
Elasticity of licences	**0.137**	

Source: Knut Blind, Hariolf Grupp, and Andre Jungmittag (op. cit.) and their calculations.

Two explanations may be offered regarding the difference in elasticities of the portfolios of patents calculated for Germany and France. The first explanation, inherent in the econometric calculations, is that this elasticity also includes other variables not taken into account by the equation. The second, more economic in nature, refers to the existing knowledge base disparity between Germany and France (Table 5).

Thus, Kul B. Luintel and Mosahid Khan (2005) show that:

> *"Countries with a low domestic knowledge base appear to improve their TFP considerably through the accumulation of knowledge. This effect is very modest for countries that already have a sizeable domestic knowledge base" …*
>
> *"The main implications of our findings are as follows. First, knowledge production is extremely heterogeneous across OECD countries and so is the relationship between knowledge stocks and TFP. Our results indicate that it is important to account for country-specific factors when designing R&D and innovation policy; a one-size-fits-all approach is unlikely to be effective. Clearly, countries that rank at the bottom of the list in terms of world-class knowledge acquisition (e.g. Ireland, New Zealand, Norway, Spain) may potentially make important gains in productivity by adopting an R&D policy that augments their knowledge accumulation. However, in countries that already have an important R&D sector (e.g. the United States, Germany, Japan, the United Kingdom, Switzerland), the contribution of knowledge stocks to TFP appears very modest".*

TABLE 5 / GERMANY/FRANCE: KNOWLEDGE BASE DIFFERENCES

(yearly average 1981-2001)

	Triadic patents	EPO Patents	US Patents	Researchers
Germany	4 254	12 487	8 481	197 000
France	1 732	4 784	3 219	128 000
Germany/France differences	145.6%	161.0%	163.5%	53.9%

Source: Kul B. Luintel and Mosahid Khan (2005) and their calculations.

Given the marked differences between knowledge base components, different elasticities are to be expected, more pronounced in France than in Germany.

As far as the long-term evolution during the 1961-1990 period is concerned, the contribution standards made to overall growth in France and Germany remained very close (0.93% compared to 0.90%).

TABLE 6 / SOURCES OF GROWTH FOR FRANCE AND GERMANY

	Growth of GDP 1 = 2 + 3		Contribution of factors (K + L) 2		Total factor productivity (TFP) 3 = 4 + 5 + 6 + 7		Stock of standards 4		Stock of patents 5		Remaining TFP (Licences for Germany) 6		Crises 7	
	AFNOR	DIN	AFNOR	DIN	AFNOR	DIN	AFNOR	DIN	AFNOR	DIN	AFNOR	DIN	AFNOR	DIN
61-90	**4.01%**	**3.30%**	2.00%	1.80%	2.01%	1.50%	*0.93%*	*0.90%*	*1.23%*	*0.10%*	*- 0.11%*	*0.50%*	*- 0.05%*	*0.00%*
61-65	**6.41%**	**5.20%**	1.64%	3.20%	4.77%	2.00%	*0.83%*	*1.50%*	*2.20%*	*0.20%*	*0.70%*	*0.60%*	*1.04%*	*- 0.30%*
66-70	**5.82%**	**4.40%**	1.49%	2.10%	4.34%	2.30%	*1.59%*	*1.20%*	*1.69%*	*0.20%*	*1.06%*	*0.50%*	*0.00%*	*0.40%*
71-75	**3.42%**	**1.70%**	3.11%	1.10%	0.30%	0.60%	*1.36%*	*0.90%*	*1.29%*	*- 0.40%*	*- 0.81%*	*0.40%*	*- 1.54%*	*- 0.30%*
76-80	**3.13%**	**3.60%**	2.56%	1.80%	0.57%	1.80%	*0.72%*	*1.10%*	*0.79%*	*0.30%*	*- 0.95%*	*0.20%*	*0.00%*	*0.20%*
81-85	**1.58%**	**1.10%**	1.40%	0.20%	0.18%	0.90%	*0.61%*	*0.40%*	*0.57%*	*0.20%*	*- 1.00%*	*0.10%*	*0.00%*	*0.20%*
86-90	**3.21%**	**3.80%**	1.89%	2.20%	1.32%	1.60%	*0.49%*	*0.20%*	*0.62%*	*0.00%*	*0.21%*	*1.30%*	*0.00%*	*0.10%*
92-96	**1.15%**	**1.50%**	0.94%	0.40%	0.21%	1.10%	*0.58%*	*0.30%*	*0.30%*	*- 0.30%*	*- 0.34%*	*0.60%*	*- 0.32%*	*0.50%*

On the other hand, significant differences are apparent during different sub-periods. During the 1961-1965 period, the difference was in Germany's favour. This period corresponds to a weak growth rate for standards in France (Graph 1).

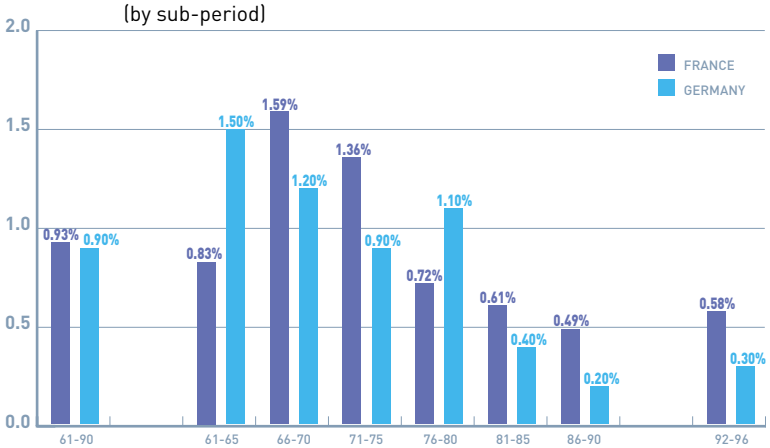
The reverse was true between 1966 and 1975, with the difference shifting in France's favour and coinciding with the beginning of a new dynamic period of French standardization and European commitment[4].

4

For a detailed analysis of the evolution of AFNOR strategies at different periods over the entire course of its history, see Alain Durand (2008) "AFNOR 80 years of history".

GRAPH 3 / CONTRIBUTION OF STANDARDS TO OVERALL GROWTH

(by sub-period)



1.6 COMPARATIVE SUMMARY OF EXISTING STUDIES

The following table shows a comparative summary of the various studies conducted to determine the impact of standardization activity on the economy.

TABLE 7 / COMPARATIVE SUMMARY OF VARIOUS EXISTING STUDIES

	Organization				
	DIN - Germany	**DTI - UK**	**Canadian Council of Standards**	**Standards Australia**	**AFNOR**
Title	*"The Economics Benefits of Standardization"*	*"The Empirical Economics of Standards"*	*"Valeur économique de la normalisation"*	*"Standards, Innovation and the Australian Economy"*	*"Impact économique de la normalisation"*
Year	1999	2005	2007	2007	**2008**
Period subject to analysis	1961-1990	1948-2001	1981-2004	1962-2004	**1950-2007**
Estimated function	Q	(Q-L)	(Q-L)	PTF	**PTF**
Elasticity of stock of standards	0.070	0.054	0.356	0.170	**0.120**
Growth rate of standards (%)	12.9	5.1	0.7	4.6	**6.8**
Impact in % points on GDP growth	0.9	0.3	0.2	0.8	**0.8**
Growth rate of GDP (%)	3.3	2.5	2.7	3.6	**3.4**
Contribution to growth of GDP (%)	27.3	11.0	9.0	21.8	**23.8**
Growth rate of the productivity of work (%)	3.0	2.1	1.4	NC	**3.0**
Contribution to the productivity of work (%)	30.1	13.0	17.0	NC	**27.1**

1.7 ›

DISCUSSION OF THE METHOD

The contribution of standards to GDP growth during the period 1950-2007 is **positive** and **statistically significant.** It represents, on a yearly average, 0.81%, i.e. almost 25% of the GDP. This impact is comparable to that found by both the Germans and Australians. It may appear overvalued; however, as the currently available work on the subject, nothing allows us, either to categorically invalidate it, or to completely validate it. Moreover, various questions arise in connection with the method adopted, regarding the quality of the estimations and the reliability of the results [5].

5

Here we follow up some of the responses to questions and remarks raised by the Australian *Productivity Commission* concerning estimates made in the work *"Standards, Innovation and the Australian Economy"*, CEI, Sidney 2007.

a) The model does not explicitly take into account the dissemination process

This is largely true – there is no explicit model of dissemination in the econometric estimates.

However, it should be noted that the exercise conducted here is consistent with most of the macroeconomic literature on the subject of the determining factors of growth in productivity.

It would be very useful to construct a dissemination model not only for standards but also for other forms of knowledge accumulation. However, the data available does not permit this.

It is not entirely correct to say that the model assumes that changes in standards will have immediate effects on productivity.

The construction of a stock of standards rules out the hypothesis of an immediate effect, as it is past accumulation that accounts for growth of TFP, and not just the publication of the current year's standards.

b) Does the measured impact of standards capture other changes in the stock of knowledge?

This is certainly the case: it is not possible to guarantee that all the relevant factors have been taken into account, and given that the stock of standards is growing, it can include other trends (e.g. continuous improvement in education of the population, which is significant over more than half a century, or accumulation of scientific and technical knowledge that is not embodied in standards or patents, etc.).

However, the inclusion of a trend in the equation allows us assume that these other trends are captured and that the coefficient associated with the variation in the stock of standards is relatively "pure".

c) Correlation does not prove causality

Again, this is certainly true. There may indeed be an interaction between standards and productivity that is more complex than that described by the equation. In certain cases the standards may lead directly to an increase in productivity, while in others, technical modifications that lead to a growth in productivity create a demand for standards, which in turn disseminate new technologies and so cause further growth in productivity.

However, the resolution of the endogeneity problem requires additional data and the use of much more complex models that lie outside the scope of this study.

KEY COMPONENTS OF THE SURVEY

2//

2.1 › METHODOLOGY

From a macroeconomic standpoint, we saw that the stock of standards had a positive impact on economic growth (an average of 0.8% during the period 1950-2007). But what about the microeconomic standpoint, or in other words, how do companies' perceive this impact?

To answer this question, in June 2008 we carried out a survey sent to managers of companies/entities of all sizes, in all sectors of activity, irrespective of whether they were involved or not in the standardization process.

To construct this survey and incorporate the most relevant ideas on the impact of voluntary standards on the economic performance of companies, we undertook widescale consultation concerning the contents. This consultation brought together contributions from within AFNOR Group as well as outside contributions (notably, from certain members of the COP, CoS and CN committees) to create a constructive broad-based questionnaire.

This questionnaire was distributed widely to 43,000 current and prospective customers of the AFNOR Group, making it possible to collect a significant response sample of 1,790 respondents (or a return rate of 4%). This sample size constituted a reliable basis for the ensuing work.

2.2 › SAMPLE STRUCTURE

TABLE 8 / SAMPLE STRUCTURE PER SIZE BRACKET

	Number	%
T < 20	501	30.3
T 20-49	179	10.8
T 50-99	176	10.7
T 100-249	278	16.8
T 250-499	131	7.9
T > 500	386	23.4
Total	**1 651**	**100.0**

Respondent company profiles: 23% are large companies, 47% are SMEs and 30% are microbusinesses.

TABLE 9 / SAMPLE STRUCTURE PER ACTIVITY SECTOR

2-figure 2008 NAF sectors	Number	%
Manufacturing industry	640	36.7
Specialized, scientific and technical activities	376	21.5
Commerce, automobile repair	147	8.4
Other activities and services	84	4.8
Public administration	75	4.3
Construction	71	4.1
Finance and insurance activities	57	3.3
Information and communication	55	3.2
Teaching	48	2.7
Health and human services	47	2.7
Administration and support activities	44	2.5
Transport and warehousing	38	2.2
Production & distribution of gas and electricity	24	1.4
Other sectors	40	2.3
Total	**1 746**	**100.0**

Services (administration including non business services) represent slightly more than 50% of the sample, industry represent 37%, trading business slightly over 8% and construction close to 4%.

TABLE 10 / SAMPLE STRUCTURE IN THE MANUFACTURING INDUSTRY

2-figure 2008 NAF sectors	Number	%
Manufacture of metal products excluding machines & equipment	80	12.5
Manufacture of machines & equipment not otherwise classified	80	12.5
Chemical industry	59	9.2
Manufacture of rubber & plastic products	54	8.4
Manufacture of electrical equipment	49	7.7
Manufacture of computer and electronic products & opt.	39	6.1
Automobile industry	36	5.6
Metallurgy	34	5.3
Food, beverage and tobacco industries	33	5.2
Manufacture of other non-metallic mineral products	30	4.7
Manufacture of textiles; clothing; shoes	27	4.2
Manufacture of other transport materials	21	3.3
Repair & installation of machinery & equipment	20	3.1
Work in wood, furniture	19	3.0
Pharmaceutical industry	14	2.2
Paper and cardboard industry	10	1.6
Other manufacturing industries	35	5.5
Total	**640**	**100.0**

With specific reference to the manufacturing industry, metal products, machines and equipment represent 25%.

TABLE 11 / SAMPLE STRUCTURE PER JOB POSITION OF RESPONDENT

	Number	%
CEO	464	25.9
R&D Director	149	8.3
Production Manager	171	9.6
Standardization Manager	85	4.8
Quality Assurance Manager	325	18.2
QSE Manager	129	7.2
Other Managers	325	18.2
Other	141	7.9
Total	**1 789**	**100.0**

Job positions of respondents break down as follows: CEOs represent approximately 26%; quality control managers, 18%; QSE directors, 7%; and standardization coordinators, close to 5%. In addition, over 52% of respondents are active in standardization work within national institutions.

TABLE 12 / SAMPLE STRUCTURE BY LEVEL OF PARTICIPATION IN STANDARDIZATION WORK WITHIN NATIONAL STANDARDIZATION ENTITIES

	Number	%
Yes	874	52.6
No	787	47.4
Total	**1 789**	**100.0**

TABLE 13 / SAMPLE STRUCTURE ACCORDING TO ENTITY STATUS

	Number	%
Independent	971	60.5
Subsidiary of a French group	333	20.8
Subsidiary of a foreign group	300	18.7
Total	**1 604**	**100.0**

Over 60% of the companies are independent.

TABLE 14 / SAMPLE STRUCTURE ACCORDING TO COMPANY SIZE AND INNOVATION ACTIVITIES

(number of companies per size bracket)

	Non-innovative	Innovative	Total
Size not available	48	64	112
T < 20	186	260	446
T 20-49	44	119	163
T 50-99	47	114	161
T 100-249	66	194	260
T 250-499	24	98	122
T > 500	47	304	351
Total	**462**	**1 153**	**1 615**

71% of the companies in the sample stated that they had engaged in innovation activities during the three years preceding the survey.

TABLE 15 / SAMPLE STRUCTURE ACCORDING TO COMPANY SIZE AND INNOVATION ACTIVITIES

(% per size bracket)

	Non-innovative	Innovative	Total
Size not available	42.9	57.1	100.0
T < 20	41.7	58.3	100.0
T 20-49	27.0	73.0	100.0
T 50-99	29.2	70.8	100.0
T 100-249	25.4	74.6	100.0
T 250-499	19.7	80.3	100.0
T > 500	13.4	86.6	100.0
Total	**28.6**	**71.4**	**100.0**

As expected, larger companies proved more innovative. In fact, approximately 87% of firms with 500 employees or more considered themselves innovative, whereas only 58% of microbusinesses classified themselves in this category.

TABLE 16 / SAMPLE STRUCTURE ACCORDING TO EXPORT ACTIVITIES

Export rate	Number	%
Non-existent	177	15.1
Exp < = 5%	249	21.2
Exp > 5 and < = 15%	220	18.7
Exp > 15 and < = 50%	317	27.0
Exp > 50%	213	18.1
Total	**1 176**	**100.0**

Approximately 15% of the entities do not export. On the other hand, approximately 45% reported an export rate greater than 15% of turnover.

2.3 VOLUNTARY STANDARDS: BENEFIT VERSUS COST

In response to the question "Do voluntary standards entail a benefit or a cost for your organization?", two-thirds (66%) of respondents associated voluntary norms with a benefit to their organization, whereas 34% associated them with a cost. Starting from this position, it is then interesting to examine what factors lie behind the concept of benefit.

The table below shows econometric[6] probability that voluntary standards will be perceived as a benefit.

6 The analysis relies on the use of econometric equations that take into account binary choices (using Probit-type logistic regressions). This method was employed based on the fact that it allows reasoning in terms of pure effect. In fact, all other factors being equal, each variable will have its own impact. This makes it possible to go beyond the limits of analyses in terms of crosstabulations, which mask the influence of any variables not indicated in the cross-correlations.

TABLE 17 / EQUATIONS OF THE BENEFITS: DETERMINANTS

		Standardisation benefit (Yes/No)	Equation 1: Objective factors		Equation 2: Opinions	
Variable	**Method**		**Coef.**	**P > z**	**Coef.**	**P > z**
	Constant		- 0.283	0.002	- 0.602	0.037
Personnel expressed in log	Natural logarithm Personnel		0.054	0.001	0.034	0.067
Activity sector	Electronics / Electrical industry		0.232	0.115	0.304	0.064
	Services		0.504	0.002	0.548	0.001
	Consultancy / R&D		0.354	0.000	0.222	0.032
	Other sectors		*Reference method*			
Innovation within last 3 years	Innovative (yes)		0.192	0.021	0.189	0.035
Status of enterprise	Foreign subsidiary		0.080	0.421	0.054	0.617
	French subsidiary		0.242	0.017	0.215	0.047
	Self-employed		*Reference method*			
Post held by respondent	Quality Manager		0.229	0.013	0.197	0.052
	Other functions		*Reference method*			
	Participation in the standardisation work		0.217	0.004	0.156	0.064
Opinion variables (Scale 0 to 10)	The existence of standards facilitates cooperation with public research institutions				0.037	0.042
	The existence of standards enables to optimise the use of raw materials and energy				0.013	0.543
	For the same quality, standardisation leads to an increase in purchasing cost of intermediate products				- 0.052	0.011
	The application of standards can lead to higher maintenance costs				- 0.036	0.094
	Standardisation leads to lower costs due to non quality				0.044	0.011
	The application of standards allows to improve productivity				0.057	0.011
	Standardisation contributes to a better valorisation of enterprises				0.101	0.000
	International standardisation increases your export capacity				0.041	0.017
	The existence of standards generates additional costs for your organisation				- 0.138	0.000
	Standardisation allows to increase or consolidate your market share				0.046	0.018
	Standardisation can act as a brake on innovation				- 0.033	0.042
	Number of observations				1 372	1 372
		Observations = 1			*66.62%*	*66.62%*
		Estimated observations = 1			*67.50%*	*71.02%*
	Wald chi²				79.030	270.030
	Prob > chi²				0.000	0.000
	Log pseudolikelihood				- 832.880	- 675.720
	Pseudo R²				0.047	0.227

The model breaks down into two equations: the first links the benefit variable with objectives variables (size, sector, innovation, status, etc.) while the second adds the variables of opinion which allow us to give content to the concept of benefit.

2.4 WHAT DO THESE EQUATIONS MEAN?

The fact that a company perceives voluntary standards as producing a benefit is not independent of its objective characteristics (Table 17 - equation 1). In fact, there is a high probability that *large size* companies will perceive voluntary standards as a benefit. This is equally true when a company belongs to the service *sector,* the electronic/electrical industry, or to the technical consultancy/R&D sector. On the other hand, being a part of the construction sector comparatively lowers the probability that a company will perceive voluntary standards as profitable. Being the *subsidiary of a French company* increases the probability that a company will perceive standardization as a benefit. Obviously, being an *independent* company decreases this perception.

Interestingly, the fact that a company is *innovative* considerably increases that probability it will judge standards to be beneficial. This can be linked to the results in the preceding section. In a certain sense, standardization works in tandem with innovation to the extent it is used as a vehicle for dissemination. Of course, this combination is not exempt from coordination problems, as we shall see below.

Equation 2 (table 17) brings content to the concept of benefit by integrating opinion variables. This allows us to identify what sort of factors are associated with the concept of benefit. Thus, significant factors that define the concept of *benefit* for a company include increasing productivity, gaining market shares, company valuation, facilitating innovation and facilitating cooperation with public R&D institutions. It is interesting to note that optimization of the use of raw materials and energy is not perceived as contributing a benefit originating from standards. Nor is it considered a cost for the company.

2.5 THE CONCEPT OF BENEFIT AND OBJECTIVES VARIABLES

TABLE 18 / PROPORTION OF COMPANIES THAT PERCEIVE STANDARDIZATION AS A BENEFIT ACCORDING TO THEIR OBJECTIVES CHARACTERISTICS

Variable	Method	Voluntary standards = benefit	Voluntary standards = cost
Activity sector	Consultancy / R&D	70.7%	29.3%
	Electrical and electronic equipment industries	74.8%	25.2%
	Construction	48.3%	51.7%
	Services	77.7%	22.3%
Size	500 or more employees	74.9%	25.1%
	250 to 499 employees	66.9%	33.1%
	100 to 249 employees	69.3%	30.7%
	50 to 99 employees	64.1%	35.9%
	20 to 49 employees	62.0%	38.0%
	< 20 employees	57.6%	42.4%
Status	Subsidiary of a foreign group	69.0%	31.0%
	Subsidiary of a French group	76.1%	23.9%
	Independent	61.6%	38.4%
Job function of respondent	Quality Assurance Manager	72.1%	27.9%
Participation in standardization work	Yes	71.2%	28.8%
	No	60.2%	39.8%
Innovative	Yes	69.1%	30.9%
	No	57.5%	42.5%
Total sample		**66.0%**	**34.0%**

TABLE 19 / WHAT BENEFITS DOES YOUR ORGANIZATION DERIVE FROM PARTICIPATING IN THE STANDARDIZATION PROCESS?

	Headcounts	%
Anticipate future market rules for your sector of activity	622	71.2
Promote your interests at European and international levels	538	61.6
Promote your interests at national level	501	57.3
Capitalize on knowledge about your sector of activity	441	50.5
Participate in a network of the most influential operators in your sector	437	50.0
Achieve recognition through an official system	377	43.1
Identify emerging themes in your sector	360	41.2
Promote new technological solutions	297	34.0
Develop your markets	191	21.9
Total	**874**	**100.0**

2.6 › THE CONCEPT OF BENEFIT AND OPINION VARIABLES

Opinion variables come from a given number of statements regarding how standardization is linked to a company's economic activity (in relation to its environment, production process, competitiveness, market and innovation). We started by attributing a score of between 0 and 10 for each of these statements, depending on to what extent the company adheres or not.

We then grouped these scores into four categories to determine what proportion of companies responded to the submitted statements with "agrees completely" (scores from 9 to 10), "somewhat agrees" (scores from 7 to 8), "somewhat disagrees" (scores from 4 to 6) and lastly, "disagrees completely" (scores from 0 to 3).

TABLE 20 / PERCEPTION OF BENEFITS OF VOLUNTARY STANDARDS
(base 100: 1,790 respondents)

Voluntary standards and the company's relationship with its environment	Yes (1 + 2)	Yes, totally agree (1)	Yes, somewhat agree (2)	No (3 + 4)	No, somewhat disagree (3)	No, totally disagree (4)	DK
Improves the quality of supplier products and services	77%	*31%*	*46%*	21%	*16%*	*5%*	2%
Enables improved communication with other companies	68%	*27%*	*41%*	29%	*23%*	*6%*	3%
Promotes collaboration with other stakeholders	56%	*22%*	*34%*	33%	*23%*	*10%*	11%
Facilitates cooperation with public research institutions	49%	*20%*	*29%*	37%	*25%*	*12%*	14%
Allows a wider choice of suppliers	32%	*10%*	*22%*	60%	*34%*	*26%*	8%
Enables reduction in contract preparation costs	31%	*10%*	*21%*	55%	*31%*	*24%*	14%

Voluntary standards and production process	Yes (1 + 2)	Yes, totally agree (1)	Yes, somewhat agree (2)	No (3 + 4)	No, somewhat disagree (3)	No, totally disagree (4)	DK
Higher maintenance costs	55%	*20%*	*35%*	37%	*21%*	*16%*	8%
Reduction in costs due to non quality	50%	*18%*	*32%*	41%	*24%*	*17%*	9%
Increase in purchase costs of intermediary products	38%	*12%*	*26%*	48%	*27%*	*21%*	14%
Optimizes the use of raw materials and energy	36%	*9%*	*27%*	49%	*32%*	*17%*	15%
Reduces the variety of products and services	34%	*10%*	*24%*	57%	*27%*	*30%*	9%

Voluntary standards and competitiveness	Yes (1 + 2)	Yes, totally agree (1)	Yes, somewhat agree (2)	No (3 + 4)	No, somewhat disagree (3)	No, totally disagree (4)	DK
Great advantage for development of international exchanges	73%	*37%*	*36%*	16%	*12%*	*4%*	11%
Contributes to enhancing status of the company	70%	*27%*	*43%*	24%	*18%*	*6%*	6%
Generates additional costs for the company/organization	56%	*24%*	*32%*	37%	*23%*	*14%*	7%
Increases capacity for export	46%	*22%*	*24%*	28%	*18%*	*10%*	26%
Enables gains in productivity	44%	*11%*	*33%*	48%	*33%*	*15%*	8%
Increases the capacity to delocalize production units	28%	*8%*	*20%*	43%	*23%*	*20%*	29%
Leads to a reduction in R&D costs	27%	*6%*	*21%*	59%	*32%*	*27%*	14%

Voluntary standards and market	Yes (1 + 2)	Yes, totally agree (1)	Yes, somewhat agree (2)	No (3 + 4)	No, somewhat disagree (3)	No, totally disagree (4)	DK
Provides benchmarks enabling to differentiate products	63%	*27%*	*36%*	29%	*20%*	*9%*	8%
Contributes to the fairness of competitive rules	61%	*29%*	*32%*	31%	*19%*	*12%*	8%
Allows to increase and consolidate your market share	43%	*12%*	*31%*	42%	*27%*	*15%*	15%
Allows to become established in new geographical areas	26%	*7%*	*19%*	49%	*25%*	*24%*	25%
Leads to a concentration of companies	23%	*6%*	*17%*	54%	*28%*	*26%*	23%

Voluntary standards and innovation	Yes (1 + 2)	Yes, totally agree (1)	Yes, somewhat agree (2)	No (3 + 4)	No, somewhat disagree (3)	No, totally disagree (4)	DK
Lags behind technological development	45%	*17%*	*28%*	37%	*24%*	*13%*	18%
Enables improved dissemination of innovations	34%	*9%*	*25%*	48%	*28%*	*20%*	18%
Can be an impediment to innovation	33%	*12%*	*21%*	54%	*27%*	*27%*	13%
Contributes to making innovations accessible	30%	*8%*	*22%*	51%	*31%*	*20%*	19%

Voluntary standards and risk prevention	Yes (1 + 2)	Yes, totally agree (1)	Yes, somewhat agree (2)	No (3 + 4)	No, somewhat disagree (3)	No, totally disagree (4)	DK
Contributes to optimizing compliance with regulations	79%	*35%*	*44%*	17%	*12%*	*5%*	4%
Allows greater control over security-related problems	74%	*30%*	*44%*	21%	*16%*	*5%*	5%
Allows greater control over environmental problems	64%	*22%*	*42%*	28%	*22%*	*6%*	8%
Leads to an improved determination of responsibilities	61%	*26%*	*35%*	30%	*22%*	*8%*	9%

2.7 SPONTANEOUS COMMENTS

TABLE 21 / SPONTANEOUS COMMENTS REGARDING THE ADVANTAGES (OR BENEFITS) OF VOLUNTARY STANDARDS

Common language/Fairness of the rules of competition
"It's a requirement level that applies to everyone that puts all competing companies on an even playing field"; "It puts competing companies on an even playing field"
"Clarification of how market rules function"
"Makes competition more equitable"; "Regulated competition"
"Everybody speaks the same language with the same bases"
"It sets common rules where competition is concerned"
"Universal language"; "A language common to all contributors"
"Speaking the same language between different companies and different countries"
"Equal treatment"; "Establishes common reference points"; "Common language components between partners"
Sign of appreciation, valorisation, credibility, trust
"Our customers appreciate our professionalism"
"Our customers appreciate the fact that our company is certified and compliant with the European standards related to our market"
"Recognition within the market"; "The company's reputation"
"Improvement of the company's brand image"; "Generates trust among our customers"
"Valorisation of the company by its customers"; "Recognition of our know-how"
"Credibility for the company where customers are concerned, credibility based on compliance with standards"
Market access and expansion
"The standard for opening"; "Expansion of the marketing market"; "Accessibility of new markets"; "Possibility of selling in new markets"; "Facilitates international exchanges by unblocking certain markets"; "International technical standards make technical protectionism more difficult"
"Facility of European exchanges"
Guarantees the quality of products and services
"Makes it possible to offer users a guarantee of quality"
"Forces companies to think 'quality'"; "It's a pledge of quality"; "Compliance with standards=product quality"; "Guarantees quality"; "Product reliability"; "Better quality products: a guarantee for consumers"
Improves the efficiency of organizations
"Improvement of the organization and the way it functions"; "Optimization of the company's operating methods"; "Better coordination between the company's various divisions"; "It allows for a good company structure via existing processes"; "Provides a framework for personnel to follow, so less energy is wasted"; "Improved mastery of activities"
"Clear definition of company activities (process approach) and declination of management objectives for each activity"
Guarantees security
"They guarantee consumers a minimum of security"
"Improvement of security for assets and people"
"Recourse to standards assures the security of our products"; "Raises the level of security"
"Minimum degree of security that should be respected"

Constitutes a knowledge base / Promotes innovation
"A valuable aid to conception"
"Prevents energy from being wasted on functions predefined by standards and enables you to concentrate on innovation and the added value brought to the free space not regulated by standards"; "Pooling of innovation"
"Companies don't have to develop or imagine what has already been standardized"; "Immense source of information"
"Aid to innovation and development"; "Constitutes a body of reference within the field"
"Constitution of a starting point: primary knowledge base"
"A form of capitalized knowledge"; "Guiding principle for innovation"
"Allows you to devote your energies to innovation and to not have to 'reinvent the wheel'"

TABLE 22 / SPONTANEOUS COMMENTS REGARDING DISADVANTAGES (OR COSTS) OF VOLUNTARY STANDARDS

Costs in terms of standard acquisition and implementation
"Rather high cost for access to standards"
"High cost of yearly subscription to technical standards"
"Investment linked to the implementation of a standard"
"Implementation involves additional costs for the company"
"Implementation is costly in small structures"

Costs in terms of standards monitoring
"Requires follow-up and an allocation of personnel"
"High cost for following the evolution of standards"
"Information that is always cumbersome to manage"
"Time that must be allocated to monitoring standards"
"Frequent evolution of standards requires documentary monitoring"

Difficult to understand / Complexity
"The way the texts are formulated is not always easy to understand"
"Sometimes there are differing interpretations"
"Complex to assimilate"
"They could be more practical and simple"
"Not accessible for everyone"
"Heavy and difficult to read for the non-initiated"
"The heaviness and incomprehensibility for certain texts. The way in which they are written by eminent specialists is not always accessible, and, more seriously, could lead to errors"

Impediment to innovation
"Can constitute an impediment to innovation by prematurely establishing rules without the benefit of hindsight"
"Too many standards make it difficult to juxtapose or understand them, at times to the point of incoherence; their purpose is to protect multinationals by establishing, in the guise of standards, the dictates of large industry to prevent innovation and to eliminate competition of any kind"
"Standards tend to rigidify the way a service or product is rolled out, thereby impeding the intentions of innovation"

CONCLUSION

In mature economies like France, where technological improvement constitutes the main source of growth, standardization contributes directly to pushing back technological frontiers, thereby benefitting the greatest number of people.

Just like patents, voluntary standards are a way of codifying knowledge. Standards work in tandem with innovation, and are also a means of disseminating it, since they enable companies to share innovation while at the same time developing good market practices.

The study confirms the benefits of standardization acknowledged by companies of all sizes: product interoperability, increased productivity, market share gains, and ease of cooperation with public R&D institutions.

5 major lessons emerge from the study:

- **Company value enhancement:** The knowledge capital contributed by corporate involvement in standardization work **represents true value.**
- **Innovation:** Standardization promotes the dissemination of innovation. It emphasizes a product's advantages and constitutes a **product selection tool.**
- **Transparency and ethics:** Standards contribute to **better compliance with the rules of competition.** By establishing the rules of the game, standards make it easier to eliminate players who fail to comply.
- **International:** By promoting the development of international exchanges, standardization provides companies with a **genuine passport for exporting** their products.
- **Product and service quality:** Standardization gives companies a great degree of control over safety-related problems and provides a genuine guarantee of quality.

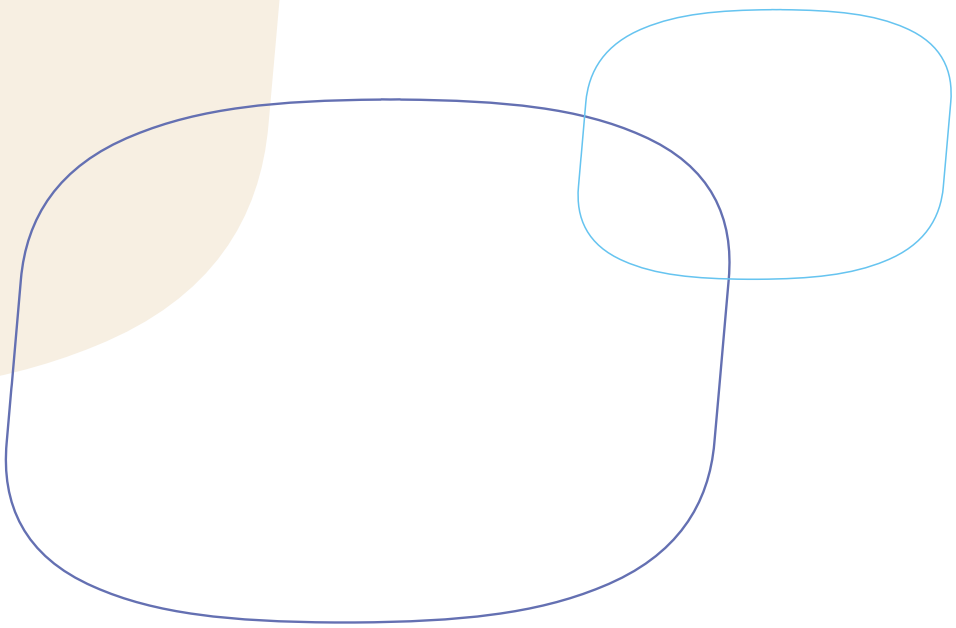
"Individual companies no longer have to redevelop or re-imagine what has already been standardized."

"Standardization: a form of capitalized knowledge and a guiding principle for innovation."

From the standpoint of macroeconomics, standardization makes a significant contribution to growth of the French economy (25% of GDP growth).

This study demonstrates to French companies of the advantages backed up by figures, of becoming more and more involved with voluntary standards.

APPENDICES



APPENDIX 1 / PERCENTAGE OF ENTERPRISES WHICH PERCEIVE VOLUNTARY STANDARDS AS A BENEFIT (VERSUS COST) DEPENDING ON THE SECTORS OF ACTIVITY

Sectors	Voluntary standards = benefit (line %)	Voluntary standards = cost (line %)	Total number of respondents
Manufacturing industry	65.1	34.9	578
Specialized, scientific and technical activities	70.7	29.3	365
Commerce, automobile repair	57.6	42.4	132
Public administration	64.3	35.7	70
Construction	48.3	51.7	60
Finance and insurance activities	76.4	23.6	55
Information and communication	77.6	22.4	49
Health and human services	52.2	47.8	46
Teaching	78.6	21.4	42
Administration and support activities	76.3	23.7	38
Transport and warehousing	80.6	19.4	36
Production & distribution of gas and electricity	86.4	13.6	22
Overall total	**66.0**	**34.0**	**1 617**

Manufacturing sectors	Voluntary standards = benefit (line %)	Voluntary standards = cost (line %)	Total number of respondents
Manufacture of metal products excluding machines & equipment	61.3	38.7	75
Manufacture of machines & equipment not otherwise classified	67.6	32.4	71
Chemical industry	72.2	27.8	54
Manufacture of rubber & plastic products	59.6	40.4	47
Manufacture of electrical equipment, electronic equipment	74.8	25.2	87
Automobile industry	61.8	38.2	34
Food, beverage and tobacco industries	65.5	34.5	29
Metallurgy	63.0	37.0	27
Manufacture of other non-metallic mineral products	68.0	32.0	25
Manufacture of textiles; clothing; shoes	50.0	50.0	24
Manufacture of other transport materials	65.0	35.0	20
Repair & installation of machinery & equipment	44.4	55.6	18
Wood-work, furniture	70.6	29.4	17
Pharmaceutical industry	78.6	21.4	14
Paper and cardboard industry	60.0	40.0	10
Total	**65.1**	**34.9**	**578**

APPENDIX 2 / VOLUNTARY STANDARDS AND THE RELATIONSHIP OF A COMPANY TO ITS ENVIRONMENT

(% of firms "in agreement" with the proposal)

Sectors	Improves the quality of supplier products and services	Enables improved communication with other companies	Promotes collaboration with other stakeholders	Facilitates cooperation with public research institutions	Allows a wider choice of suppliers	Enables the reduction of contract preparation costs
Manufacturing industry	78.1	73.0	50.6	48.9	31.3	33.9
Specialized, scientific and technical activities	77.1	68.9	57.2	44.7	30.6	28.7
Commerce, automobile repair	77.6	59.9	51.7	44.2	31.3	29.9
Other services activities	65.5	65.5	63.1	56.0	33.3	26.2
Public administration	78.7	74.7	77.3	68.0	30.7	28.0
Construction	76.1	46.5	39.4	38.0	29.6	12.7
Finance and insurance activities	87.7	70.2	68.4	50.9	33.3	40.4
Information and communication	72.7	65.5	60.0	52.7	36.4	25.5
Teaching	70.8	60.4	56.3	41.7	29.2	39.6
Health and human services	78.7	59.6	63.8	57.4	38.3	29.8
Administration and support activities	81.8	61.4	40.9	27.3	27.3	20.5
Other sectors	82.5	57.5	70.0	60.0	25.0	35.0
Transport and warehousing	71.1	71.1	57.9	42.1	28.9	36.8
Production & distribution of gas and electricity	91.7	83.3	70.8	75.0	50.0	66.7
Overall total	**77.3**	**68.0**	**55.8**	**48.3**	**31.6**	**31.4**

APPENDIX 3 / VOLUNTARY STANDARDS AND THE PRODUCTION PROCESS

(% of firms "in agreement" with the proposal)

Sectors	Higher maintenance costs	Reduction in costs due to non quality	Increase in purchase costs of intermediary products	Optimizes the use of raw materials and energy	Reduces the variety of products and services
Manufacturing industry	58.0	50.9	43.0	34.5	38.1
Specialized, scientific and technical activities	53.2	51.9	34.0	32.7	33.5
Commerce, automobile repair	64.6	43.5	53.7	39.5	40.1
Other services activities	52.4	44.0	33.3	29.8	27.4
Public administration	45.3	37.3	28.0	37.3	33.3
Construction	63.4	43.7	45.1	38.0	38.0
Finance and insurance activities	33.3	63.2	24.6	42.1	31.6
Information and communication	36.4	52.7	21.8	34.5	27.3
Teaching	47.9	50.0	25.0	33.3	25.0
Health and human services	61.7	51.1	44.7	38.3	31.9
Administration and support activities	52.3	65.9	29.5	40.9	20.5
Other sectors	57.5	47.5	40.0	42.5	50.0
Transport and warehousing	44.7	47.4	31.6	42.1	18.4
Production & distribution of gas and electricity	37.5	62.5	16.7	45.8	20.8
Overall total	**54.7**	**50.0**	**38.3**	**35.8**	**34.8**

APPENDIX 4 / VOLUNTARY STANDARDS AND COMPETITION

(% of firms "in agreement" with the proposal)

Sectors	Great advantage for development of international exchanges	Contributes to enhancing status of the company	Generates additional costs for the company / organization	Increases capacity for export	Enables gains in productivity	Increases the capacity to delocalize production units
Manufacturing industry	79.2	70.5	62.0	54.8	37.7	31.9
Specialized, scientific and technical activities	71.5	66.8	51.3	45.2	47.1	27.1
Commerce, automobile repair	69.4	70.7	66.7	44.9	36.7	32.0
Other services activities	65.5	69.0	53.6	39.3	45.2	17.9
Public administration	73.3	65.3	37.3	28.0	37.3	21.3
Construction	54.9	63.4	54.9	28.2	40.8	25.4
Finance and insurance activities	80.7	66.7	49.1	43.9	52.6	26.3
Information and communication	78.2	67.3	36.4	45.5	61.8	25.5
Teaching	66.7	64.6	39.6	35.4	41.7	29.2
Health and human services	48.9	83.0	63.8	4.3	63.8	19.1
Administration and support activities	72.7	79.5	65.9	31.8	61.4	22.7
Other sectors	67.5	77.5	55.0	37.5	35.0	30.0
Transport and warehousing	71.1	71.1	42.1	71.1	55.3	21.1
Production & distribution of gas and electricity	75.0	75.0	29.2	50.0	70.8	37.5
Overall total	**72.8**	**69.7**	**55.7**	**45.7**	**43.8**	**28.1**

APPENDIX 5 / VOLUNTARY STANDARDS AND THE MARKET

(% of firms "in agreement" with the proposal)

Sectors	Provides benchmarks enabling to differentiate products	Contributes to the fairness of competitive rules	Allows to increase and consolidate your market share	Allows to become established in new geographical areas	Leads to a concentration of companies
Manufacturing industry	66.7	64.5	45.8	28.8	24.2
Specialized, scientific and technical activities	61.4	59.0	41.0	25.3	23.9
Commerce, automobile repair	63.9	56.5	46.3	25.9	29.3
Other services activities	64.3	54.8	36.9	20.2	14.3
Public administration	61.3	62.7	29.3	14.7	18.7
Construction	62.0	53.5	36.6	22.5	29.6
Finance and insurance activities	52.6	63.2	42.1	28.1	24.6
Information and communication	52.7	47.3	45.5	21.8	18.2
Teaching	62.5	43.8	35.4	25.0	18.8
Health and human services	66.0	53.2	46.8	19.1	29.8
Administration and support activities	59.1	68.2	50.0	27.3	15.9
Other sectors	62.5	70.0	37.5	7.5	15.0
Transport and warehousing	60.5	63.2	44.7	26.3	21.1
Production & distribution of gas and electricity	66.7	75.0	29.2	33.3	12.5
Overall total	**63.5**	**60.5**	**42.8**	**25.4**	**23.0**

APPENDIX 6 / VOLUNTARY STANDARDS AND INNOVATION

(% of firms "in agreement" with the proposal)

Sectors	Lags behind technological development	Enables improved dissemination of innovations	Can be an impediment to innovation	Contributes to making innovations accessible
Manufacturing industry	45.6	30.8	36.4	23.6
Specialized, scientific and technical activities	49.5	34.8	34.3	31.9
Commerce, automobile repair	48.3	33.3	38.8	27.2
Other services activities	39.3	35.7	40.5	31.0
Public administration	40.0	45.3	26.7	46.7
Construction	49.3	35.2	28.2	33.8
Finance and insurance activities	42.1	24.6	28.1	28.1
Information and communication	41.8	40.0	18.2	30.9
Teaching	37.5	37.5	31.3	35.4
Health and human services	31.9	31.9	21.3	25.5
Administration and support activities	45.5	29.5	29.5	29.5
Other sectors	32.5	40.0	27.5	30.0
Transport and warehousing	18.4	26.3	13.2	28.9
Production & distribution of gas and electricity	37.5	37.5	33.3	37.5
Overall total	**44.4**	**33.5**	**33.1**	**29.0**

APPENDIX 7 / VOLUNTARY STANDARDS AND RISK PREVENTION

(% of firms "in agreement" with the proposal)

Sectors	Contributes to optimizing compliance with regulations	Allows greater control over security-related problems	Allows greater control over environmental problems	Leads to an improved determination of responsibilities
Manufacturing industry	81.6	77.3	69.1	59.4
Specialized, scientific and technical activities	75.8	68.4	59.0	59.0
Commerce, automobile repair	80.3	75.5	66.0	64.6
Other services activities	76.2	61.9	52.4	67.9
Public administration	82.7	69.3	62.7	61.3
Construction	71.8	71.8	63.4	52.1
Finance and insurance activities	75.4	66.7	56.1	57.9
Information and communication	78.2	72.7	50.9	58.2
Teaching	66.7	70.8	54.2	62.5
Health and human services	72.3	68.1	46.8	59.6
Administration and support activities	88.6	88.6	77.3	77.3
Other sectors	90.0	77.5	55.0	70.0
Transport and warehousing	81.6	81.6	71.1	65.8
Production & distribution of gas and electricity	79.2	87.5	75.0	66.7
Overall total	**78.9**	**73.6**	**63.4**	**60.7**

APPENDIX 8 / VOLUNTARY STANDARDS AND THE RELATIONSHIP OF A COMPANY TO ITS ENVIRONMENT

(% of firms "in agreement" with the proposal)

Manufacturing sectors	Improves the quality of supplier products and services	Enables improved communication with other companies	Promotes collaboration with other stakeholders	Facilitates cooperation with public research institutions	Allows a wider choice of suppliers	Enables to reduce contract preparation costs
Manufacture of metal products excl. mach. & equip.	81.3	82.5	40.0	50.0	25.0	26.3
Manufacture of mach. & equip. not otherwise classified	72.5	75.0	50.0	47.5	30.0	33.8
Chemical industry	78.0	79.7	64.4	64.4	37.3	27.1
Manufacture of rubber & plastic products	87.0	81.5	51.9	61.1	29.6	25.9
Manufacture of electrical equipment	87.8	85.7	61.2	46.9	40.8	51.0
Manufacture of computer, elect. and optical products	69.2	71.8	35.9	30.8	25.6	41.0
Automobile industry	77.8	66.7	44.4	33.3	41.7	47.2
Metallurgy	73.5	67.6	47.1	47.1	23.5	32.4
Food, beverage and tobacco industries	75.8	51.5	60.6	48.5	24.2	27.3
Manufacture of other non-metallic mineral products	90.0	76.7	56.7	46.7	40.0	26.7
Manufacture of textiles; clothing; shoes	74.1	59.3	51.9	48.1	37.0	37.0
Manufacture of other transport materials	76.2	81.0	38.1	38.1	38.1	42.9
Repair & installation of machinery & equipment	85.0	70.0	60.0	40.0	40.0	45.0
Wood-work, furniture	63.2	52.6	36.8	68.4	31.6	21.1
Pharmaceutical industry	92.9	64.3	57.1	50.0	14.3	28.6
Paper and cardboard industry	40.0	50.0	50.0	50.0	30.0	40.0
Other manufacturing industries	77.1	62.9	54.3	48.6	22.9	37.1
Total	**78.1**	**73.0**	**50.6**	**48.9**	**31.3**	**33.9**

APPENDIX 9 / VOLUNTARY STANDARDS AND THE PRODUCTION PROCESS

(% of firms "in agreement" with the proposal)

Manufacturing sectors	Higher maintenance costs	Reduction in costs due to non quality	Increase in purchase costs of intermediary products	Optimizes the use of raw materials and energy	Reduces the variety of products and services
Manufacture of metal products excluding machines & equipment	58.8	51.3	45.0	51.3	41.3
Manufacture of machines & equipment not otherwise classified	52.5	50.0	43.8	28.8	46.3
Chemical industry	62.7	55.9	44.1	33.9	42.4
Manufacture of rubber & plastic products	55.6	59.3	38.9	35.2	33.3
Manufacture of electrical equipment	49.0	65.3	34.7	34.7	36.7
Manufacture of computer, electronic and optical products	53.8	41.0	46.2	25.6	48.7
Automobile industry	61.1	44.4	44.4	36.1	41.7
Metallurgy	61.8	55.9	29.4	26.5	29.4
Food, beverage and tobacco industries	66.7	42.4	30.3	36.4	21.2
Manufacture of other non-metallic mineral products	63.3	43.3	36.7	26.7	26.7
Manufacture of textiles; clothing; shoes	74.1	51.9	63.0	25.9	37.0
Manufacture of other transport materials	33.3	47.6	38.1	47.6	52.4
Repair & installation of machinery & equipment	75.0	40.0	55.0	30.0	25.0
Wood-work, furniture	42.1	36.8	47.4	31.6	36.8
Pharmaceutical industry	64.3	71.4	50.0	50.0	28.6
Paper and cardboard industry	40.0	40.0	20.0	30.0	30.0
Other manufacturing industries	65.7	48.6	60.0	28.6	40.0
Total	**58.0**	**50.9**	**43.0**	**34.5**	**38.1**

APPENDIX 10 / VOLUNTARY STANDARDS AND COMPETITION

(% of firms "in agreement" with the proposal)

Manufacturing sectors	Great advantage for development of international exchanges	Contributes to enhancing status of the company	Generates additional costs for the company / organization	Increases capacity for export
Manufacture of metal products excluding machines & equipment	80.0	72.5	25.0	67.5
Manufacture of machines & equipment not otherwise classified	83.8	67.5	35.0	52.5
Chemical industry	78.0	81.4	28.8	52.5
Manufacture of rubber & plastic products	77.8	79.6	20.4	57.4
Manufacture of electrical equipment	93.9	81.6	44.9	57.1
Manufacture of computer, electronic and optical products	74.4	74.4	33.3	46.2
Automobile industry	77.8	63.9	33.3	50.0
Metallurgy	82.4	67.6	35.3	73.5
Food, beverage and tobacco industries	60.6	60.6	30.3	30.3
Manufacture of other non-metallic mineral products	73.3	76.7	30.0	56.7
Manufacture of textiles; clothing; shoes	77.8	59.3	29.6	40.7
Manufacture of other transport materials	95.2	57.1	57.1	76.2
Repair & installation of machinery & equipment	75.0	65.0	25.0	50.0
Wood-work, furniture	78.9	68.4	31.6	42.1
Pharmaceutical industry	92.9	71.4	28.6	57.1
Paper and cardboard industry	40.0	40.0	20.0	80.0
Other manufacturing industries	77.1	62.9	37.1	45.7
Total	**79.2**	**70.5**	**31.9**	**54.8**

APPENDIX 11 / VOLUNTARY STANDARDS AND THE MARKET

(% of firms "in agreement" with the proposal)

Manufacturing sectors	Provides benchmarks enabling to differentiate products	Contributes to the fairness of competitive rules	Allows to increase and consolidate your market share	Allows to become established in new geographical areas
Manufacture of metal products excluding machines & equipment	75.0	70.0	51.3	21.3
Manufacture of machines & equipment not otherwise classified	65.0	63.8	36.3	25.0
Chemical industry	67.8	66.1	50.8	28.8
Manufacture of rubber & plastic products	70.4	66.7	63.0	31.5
Manufacture of electrical equipment	59.2	75.5	57.1	44.9
Manufacture of computer, electronic and optical products	69.2	51.3	46.2	28.2
Automobile industry	50.0	63.9	30.6	22.2
Metallurgy	76.5	67.6	50.0	20.6
Food, beverage and tobacco industries	48.5	66.7	42.4	27.3
Manufacture of other non-metallic mineral products	73.3	60.0	43.3	36.7
Manufacture of textiles; clothing; shoes	85.2	74.1	51.9	33.3
Manufacture of other transport materials	66.7	61.9	38.1	28.6
Repair & installation of machinery & equipment	55.0	50.0	30.0	25.0
Wood-work, furniture	73.7	36.8	42.1	26.3
Pharmaceutical industry	64.3	50.0	42.9	35.7
Paper and cardboard industry	40.0	50.0	30.0	20.0
Other manufacturing industries	68.6	74.3	37.1	37.1
Total	**66.7**	**64.5**	**45.8**	**28.8**

APPENDIX 12 / VOLUNTARY STANDARDS AND INNOVATION

(% of firms "in agreement" with the proposal)

Manufacturing sectors	Lags behind technological development	Enables improved dissemination of innovations	Can be an impediment to innovation	Contributes to making innovations accessible
Manufacture of metal products excluding machines & equipment	40.0	20.0	28.8	16.3
Manufacture of machines & equipment not otherwise classified	48.8	31.3	45.0	23.8
Chemical industry	42.4	27.1	42.4	27.1
Manufacture of rubber & plastic products	44.4	44.4	31.5	31.5
Manufacture of electrical equipment	42.9	34.7	38.8	32.7
Manufacture of computer, electronic and optical products	48.7	20.5	43.6	20.5
Automobile industry	33.3	36.1	30.6	25.0
Metallurgy	44.1	23.5	17.6	14.7
Food, beverage and tobacco industries	33.3	21.2	9.1	9.1
Manufacture of other non-metallic mineral products	46.7	43.3	43.3	23.3
Manufacture of textiles; clothing; shoes	44.4	44.4	48.1	33.3
Manufacture of other transport materials	61.9	42.9	28.6	19.0
Repair & installation of machinery & equipment	70.0	30.0	60.0	30.0
Wood-work, furniture	52.6	26.3	42.1	10.5
Pharmaceutical industry	28.6	35.7	21.4	35.7
Paper and cardboard industry	50.0	20.0	30.0	30.0
Other manufacturing industries	62.9	31.4	51.4	25.7
Total	**45.6**	**30.8**	**36.4**	**23.6**

ANNEXE 13 / VOLUNTARY STANDARDS AND RISK PREVENTION

(% of firms "in agreement" with the proposal)

Manufacturing sectors	Contributes to optimizing compliance with regulations	Allows greater control over security-related problems	Allows greater control over environmental problems	Leads to an improved determination of responsibilities
Manufacture of metal products excluding machines & equipment	78.8	70.0	68.8	58.8
Manufacture of machines & equipment not otherwise classified	80.0	75.0	67.5	62.5
Chemical industry	81.4	72.9	64.4	59.3
Manufacture of rubber & plastic products	85.2	83.3	66.7	63.0
Manufacture of electrical equipment	87.8	87.8	73.5	67.3
Manufacture of computer, electronic and optical products	79.5	79.5	69.2	53.8
Automobile industry	77.8	80.6	72.2	44.4
Metallurgy	82.4	70.6	76.5	61.8
Food, beverage and tobacco industries	84.8	78.8	72.7	60.6
Manufacture of other non-metallic mineral products	80.0	76.7	70.0	70.0
Manufacture of textiles; clothing; shoes	85.2	77.8	59.3	44.0
Manufacture of other transport materials	81.0	90.5	85.7	66.7
Repair & installation of machinery & equipment	80.0	70.0	55.0	60.0
Wood-work, furniture	73.7	57.9	42.1	36.8
Pharmaceutical industry	85.7	92.9	85.7	57.1
Paper and cardboard industry	70.0	70.0	70.0	60.0
Other manufacturing industries	85.7	85.7	77.1	65.7
Total	**81.6**	**77.3**	**69.1**	**59.4**

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11 rue Francis de Pressensé - 93571 La Plaine Saint-Denis Cedex - France - T. +33 (0)1 41 62 80 00 - F. +33 (0)1 49 17 90 00
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