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What is the Purpose of ISO 9000 Certification ? Empirical Evidence From French Micro-data

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Abstract: *The ISO 9000 certification is often associated with quality approach, and activities that are by now widely diffused throughout business. The statistical research shows that quality management practice is one of the most utilized tools because in 1997, more than a third of industrial firms have received the quality certification. Regarded like an investment in a diploma, investment in quality norms can at the same time be a function of improvement of the company's competence and can also make a signal on the market. In our research, we want to understand those two functions of the ISO 9000 certification and to see how they act in the company and on the market. The paper will explore two possible functions of the certification and will analysis the consequences for the firms. The research will use national statistics sources and case research for the empirical investigation to identify the internal characteristics of ISO 9000 adoption. Also, it will use C.O.I database (Organizational Changes and Computerization) of 1997 and E.A.E. database (Annual Survey of Industry). In this research, the empirical results show that ISO certification has a part of increase the level of firm's export. Moreover, the firms that have recently adopted the ISO certification invest more in quality than those that have adopted ISO certification more ago. The results show that the firms from same sector of activity "are pushed" to adopt certification. At the end, the results show that, the probability that the firm adopt ISO certification increase with firm's size.*

1. INPRODUCTION

One of the ways for the company to achieve all factors that are necessary to realize business success is the implementation of *ISO certification* (International Standard Organization). *Quality norms* are very often associated with formal quality actions and activities that are by now widely diffused throughout business. The statistical databases show that quality standards management is one of the most utilized tools of business performance management. But the adoption of quality standards will yet further increase because companies have realized that ISO certification has became one of the basic tools for business success.

The aim of the paper is to develop an economic analysis of *ISO 9000 norms*. Regarded like an investment in a diploma, investment in quality norms can at the same time be a function of improvement of the company's *performance* and can also make a *signal* on the market. In our research, we want to understand those two functions of the ISO 9000 certification and to see how they act in the company and on the market.

In the first section we will explore the literature review, where we will try to define the ISO certification. In this section we will explore theoretically these two possible functions of the certification and will analyze the consequences for the industrial

organization.

In the second section we will present the surveys that we utilized (Organizational Changes and Computerization of 1997 and Annual Survey of Industry). Furthermore, it will present the hypothesis and variables that we utilized to get the results.

The discussion of the results and the conclusion are presented in the forth and fifth section.

2. THE CONTEXT OF THE ISO CERTIFICATION DIFFUSION

Since then the quality certification has emerged as a key organizational practice helping companies worldwide to establish rationalized production processes (Isin Guler et al., 1999). The most influential and pervasive quality practice in the world is associated with the 9000 family certificates sponsored by the International Organization for Standardization (ISO), based in Geneva, Switzerland. The ISO's goal is to "promote the development of standardization and related activities in the world with a view to facilitate an international exchange of goods and services, and to develop cooperation in the spheres of intellectual, scientific, technological and economic activity" (ISO, 1998).

The first ISO 9000 certificates attesting that firms were adhering to standards were issued in 1987 (ISO, 2001). Having been founded in Europe, the ISO standards firstly diffused among the firms in the member countries of the European Union (EU). According to Corbett (2005), the ISO 9000 was initially adopted by a large number of firms in Europe, and then imported by supplier firms in other countries exporting to Europe. Those supplier firms, in turn, triggered a diffusion of traditional single market mechanisms, hence contributing to certification by other firms within their country. Indeed, the majority of companies that obtain the ISO 9000 certification have a part of their business in Europe and they are obliged to have this kind of certification to prove their quality. In addition, companies that export to Europe often assume that they have to be certified in order to do business in the countries of EC. In fact, in US, large companies like General Electrics, Du Pont and Eastman Kodak started to demand that their suppliers become certified.

The notation that the ISO 9000 is a generic standard implies that the same standards can be applied to any organization, regardless of the country of origin, the company size, the product line, and the economic sector. In the ISO 9000 context the standardized definition of quality refers to "all that features of a product or service which is required by the customer" (ISO 2004). However, as cited in Singels, Ruel, and Van de Water (2001) "it is important to note that the ISO standards cannot be applied in the same manner in every organization. Moreover, "the standards only recommend the essential elements of a proper quality assurance system, without recommending the ways to apply them" (Tsiotras and Gotzamani, 1996). Therefore, each organization can design its own system that fits its specific needs and the general requirements of the ISO 9000 standards.

Improved communication has been a frequently cited benefit of the ISO 9000 certification. In a survey of ISO 9000-certified manufacturing companies in New Zealand, Lee and Palmer (1999) reported that both large (defined as those with more than 100 employees) and small companies experienced improved communication after the ISO implementation. Zuckerman (1998) indicated that interpersonal communication between employees and managers and between employees and customers could be significantly improved, and that internal conflicts could be reduced with the ISO 9000 registration. As a result of improved internal communication, some companies achieving the ISO 9000 certification also report improved company operations. Similarly, Lee and Palmer (1999) found that companies that obtained the ISO 9000 certification show related performance improvements, especially in relation to firm size. Nonetheless, the ISO 9000 certification is not a risk-free undertaking. The cost of certification can be very high (ranging from $10 000 to $300 000 per company) (Anderson et al., 1999).

Standards like the ISO 9000 are intended to differentiate the quality management practice among the firms. It presents the signal (Spence1973) of the quality to all participants

on the markets especially those who act abroad. Moreover, in order to avoid situations where customers only trust domestic suppliers, the certification with an internationally recognized standard may play a strong role in signaling unobservable attributes and generating trust (Zucker, 1986). It has been argued that the ISO 9000 certification represents for the company the same as for an individual to have a college diploma (Naveh et al., 1999). This comparison can be supported by Spence's theory on job market signaling. Relating to this theory, market signaling can act to differentiate high productivity job applicants from low productivity ones, independently of whether students learn anything in the process of attending a college.

Because getting a diploma requires an effort that is likely to be more arduous for less productive students, high productivity students are more likely to complete a college degree. The important key here is also a signaling cost, because the individual will more likely invest in education if there is a guaranteed return. We can therefore argue that the managers act to introduce the ISO 9000 certification in same way as the employers who hire individuals. For this reason, Cole (1999) suggests that firms may make the ISO 9000 "their primary instrument for signaling quality to their customers." In addition, Anderson 1999 argues that the ISO 9000 certification may signal that certified organizations have better quality management systems than uncertified competitors. As such, they show to their customers that they will satisfy their expectations concerning quality and also distinguish their businesses from competitors who are not ISO certified.

Furthermore, multinationals prefer the ISO 9000 certified suppliers when they locate for example production plants in a foreign country. In Singapore, for example, local suppliers have had to "respond to requests for a third-party certification from a large number of locally based multinational companies" (Anderson, 1998). In addition, some European and American multinationals have proposed asking the suppliers to report their compliance with the ISO 9000, rather then obtaining certification themselves (Zuckerman, 1998). Furthermore, multinationals such as Hewlett-Packard, Motorola, Xerox and the Big Three Automakers use the ISO- based criteria to certify their own suppliers and have also aligned their internal quality systems with the ISO guidelines (Quality, 1994). Even if multinationals circumvent the formal ISO certification process, however, suppliers will likely have an incentive to seek the ISO certification through a national quality association in order to sell to other multinationals.

Industry experts suggest that companies that adopt the standard are trying to make a signal to stakeholders and this signal is less costly if acquired by a company that is already well managed. In other words, the standard does not necessarily improve the quality management but helps well-managed organizations promote their excellence by increasing their market share and reducing transaction costs with suppliers and consumers (Terlaak and King, 2002).

Relating to Terlaak and King (2002), the expected adoption rate of the ISO certification depends on the industry and the performance level of each company within industry. Each manager that decides whether to adopt the ISO certification must predict the performance level that will separate "adopters from non-adopters"1. According to signaling theory (Spence, 1973), all companies with a high performance level will adopt the ISO certification.

3. EMPIRICAL ANALYSIS

3.1 The survey and descriptive statistics

The research is based on two surveys, but the principal survey that we utilized is the Organizational Changes and Computerization of 1997 (COI).

The researchers and economic administrative statisticians created the survey Organizational Changes and Computerization. It was realized by the DARES, the SESSI, the SCESS and the INSEE in 1997 and coordinated by the Centre d'Etudes de l'Emploi (CEE). This collaboration gathered together a great deal of knowledge, which has made it possible to put together the surveys of different companies and the survey concerning

[1] The companies that are certified by ISO 9000
The companies that are not certified by ISO 9000

employees.

In this survey, we can find the manufacturing industry, the agro-food industry (IAA), branches of the services sector (i.e. accountancy), and branches of the commercial sector. The choice of the companies is based on the file of the companies in the Annual Survey of Industry (EAE). The selection of the companies appeared in a file of Annual Declaration of the Social Data (DADS) and the employees are selected in random way in each company.

The section “employer/employee” differs depending on the sector of activity, but the research is based on questions to the manufacturing industry and to the IAA that consist of the same questionnaires.

The section “labor force” is unique for all activity sectors. The employees with a minimum of one year of seniority were interrogated by the telephone and home visit. This section is based on the characteristics of work of employees, for example the elements that influence their pay, the rhythm of work, the evaluation of work and the utilization of the technology.

Like we previously said, the research is based on the questionnaires of the manufacturing industry and the IAA and also on the questions from files of Annual Surveys of Industry (EAE). We worked with sample of 24022 companies (weighted by the number of employees) more than 20 employees, which is utilized for the descriptive statistics and the sample of 4653 (none weighted) for the regression estimation.

The majority part of questions that are utilized from the survey COI give the comparison between two dates, 1994 and 1997. This comparison gave the possibility to see that there was a change in this period, and most of all significant changes concerning the companies that had the ISO certification in 1994 and the companies that adopted ISO in 1997.

This comparison between two dates helps me to understand the evolution of companies that had ISO certification, in which domain of business performance the company has evaluated, why do companies adopt ISO certification etc.

To understand better business performance of companies that adopt the ISO certification in different period, we have distinguished two types of companies: early adopters (those who have ISO certification in 1994) and new adopters (companies certified by ISO in 1997).

The database that we utilized, also allowed me to understand two possible functions of certification (improvement of the competence of the company and to make a signal of quality on the market) but also their influence on different elements of the companies and the different actors in the market.

Before we start to analyze Table 1, we will explain variables that are utilized to create this table. First of all, we created three categories of adopters of ISO 9000 certification: not adopters, early adopters and new adopters. “Not adopters” category includes companies that do not have ISO certification in either 1994 or 1997. A category called “early adopters” presents companies that have been certified with ISO 9000 certification since 1994 (also in 1997). A category named “new adopters” present companies that have been ISO 9000 certified since 1997 (but not in 1994).

We created also four other categories, where we added the certification concerning the suppliers of the company.

“New complete adopters” presents companies and their suppliers that have been certified with ISO 9000 since 1997 (i.e. not since 1994).

A category called “indirect adopters” presents companies not certified with ISO 9000 certification, but their suppliers are certified with ISO 9000.

A category called “new direct adopters” presents companies that have ISO certification since 1997, but their suppliers do not.

The fourth category called “non direct or indirect adopters” presents companies that do not have ISO certification and their suppliers also do not have ISO certification.

Important to mention is that the “early adopters” of ISO certification can also be a part of "new complete adopters". The reason for this is that the category of “early adopters” contains

the companies that are certified since 1994, but also in 1997.

	Non adopters	Early adopters	New adopters	Total
New complete Adopters	0 0%	2778 37% (a)	4560 63%	7337 31%
Indirect Adopters	5320 100%	0 0%	0 0%	5320 22%
New adopters direct	0 0%	422 49%	447 52%	869 4%
Non adopters direct or indirect	10496 100%	0 0%	0 0%	10496 44%
Total	15816 66%	3199 13%	5007 21%	24022 100%

	Non adopters	Early adopters	New adopters	Total
New complete Adopters	0 0%	2778 37%(a)	4560 63%	7337 31%
Indirect Adopters	5320 100%	0 0%	0 0%	5320 22%
New adopters direct	0 0%	422 49%	447 52%	869 4%
Non adopters direct or indirect	10496 100%	0 0%	0 0%	10496 44%
Total	15816 66%	3199 13%	5007 21%	24022 100%

Table 1: Descriptive statistics of different types of certification

Source: C.O.I survey, 1997 database of 24022 companies, weighted by the number of employees
Parameter: manufacturing industries and agro-food industry
Lecture: (a) 37%of 'new complete adopters' companies are "early adopters" (i.e. certified with ISO 9000 in 1994).

"New complete adopters" companies make up 31% of the total number of companies studied. As we can see from table 1, a majority of these companies and their suppliers (63%) are certified with ISO 9000 in 1997 ("new complete adopters"). Moreover 37% of the "new complete adopters" companies are certified with ISO 9000 in 1994 ("early adopters).

As expected, the category "indirect adopters" does not include companies under category "early and new adopters". This category represents 22% of the total number of companies and it is entirely composed from "non-adopters". Interestingly, as many as 66% of companies are non-ISO certified. Only one third of these companies are certified indirectly via their certified suppliers while the other two

thirds are not certified directly or indirectly. Indirectly certified companies belong to small and middle size companies (see Table 2) and through their suppliers, they make a signal of quality on the market to improve their business.

Finally, companies that are certified by ISO 9000 but their suppliers are not ("new direct adopters") representing only 4% (22340 companies) of the total number of companies. About a half of all "new direct adopters" companies belongs to the "early adopters" group whilst the other half is made up of "new adopters".

	Early complete Adopters	New complete Adopters	Indirect Adopters	Non Adopters	Total
20 to 49 employees	1106 9% (a)	1714 13%	3206 25%	6902 53%	12929 56%
50 to 199 employees	1066 16%	1655 24%	1523 22%	2578 38%	6818 30%
200 employees and more	558 22%	1139 44%	457 18%	439 17%	2593 11%
Total	2730 12%	4508 20%	5186 23%	9915 45%	22340 100%

Table 2. ISO 9000 Norms and Company's Size

Source: C.O.I survey, 1997 database of 22340 companies, weighted by the number of employees
Parameter: manufacturing industries and agro-food industry of more than 20 employees
Missing value: 851 companies (ISO97=1 and ISOF97=0). There is a small group of companies that obtained ISO 9000 certification in 1997, but their suppliers were not certified. At the moment, I am not interested in this category of companies, so I decided to eliminate this category of companies from my research.
Lecture: (a) 9% of "early complete adopters" are companies that have from 20 to 49 employees (category-small company

Before presenting the results in Table 2, we will explain variables that I used to create this table. The category called "early complete adopters" presents companies that have been certified with ISO 9000 in 1994 and 1997 and their suppliers have also been certified. The other three categories including "new complete adopters", "indirect adopters" and "non adopters" were already explained above (see Table 1).

Concerning the size of a company, we divided companies into three further categories depending on the number of employees a company consists of: small (20 to 49 employees), medium-sized (50 to 199 employees) and large (more than 200 employees).

Table 2 shows that the category of big companies is concentrated in the category "new complete adopters" (44%). The adoption rate of "early complete adopters" is not too high (22%). This can be explained by the fact that even big companies had difficulties to adopt ISO certification in 1994. Table 2 illustrates that the "early complete adopters" and "new complete adopters" of ISO certification are positively correlated with companies' size.

For these two categories of the companies adoption rate of ISO certification increases after 1994.This results suggests that after 1994, companies of all sizes understand the importance of the ISO certification as an essential tool for business success.

In the comparison with two preceding categories, table 2 shows that small companies are more concentrated in the category of "indirect adopters". This signifies that small companies probably want to avoid difficult and expensive process of certification, whilst still making a signal of their quality on the market in an indirect way (i.e. through their certified suppliers). In addition, non-certified companies are strongly represented in the category of small size companies.

	Early complete Adopters	New complete Adopters	Indirect Adopters	Non Adopters
Proposition of the improvement of the working place	68%(a)	71%	61%	56%
Make quality tests	51%	53%	41%	40%
Impossible to respect both: deadline and production rate	49%	51%	53%	48%
Have to respect coded quality norms	44%	44%	37%	31%
Elements that have influence on employees	71%	74%	70%	63%
Total number of observation	481	895	447	588

Table 3. ISO 9000 Standards and "Labour Force"

Source: C.O.I survey (section employer/employee and labour force), 1997 database of 2502 companies
Parameter: manufacturing industries and agro-food industry of more then 20 employees
Missing value: 97 companies (ISO97=1 and ISOF97=0)
Lecture: (a) 68% of the companies under the category "early complete adopters" make their employees to propose the improvement of their working place

In the table 3 we use the variables that we find in the section "labour force" to understand the impact of the ISO certification on the different factors concerning the employees. From the table 3 we can see that in the category "new complete adopters" there is 71% of the companies, from the total number of observation (895) in this category, where their employees make the proposition of improvement of their working place. We can see that the group the "new complete adopters" has the highest number of the observation, but even have the highest percentage of companies where their employees make proposition of improvement, comparing to others categories. The similar situation is concerning the quality tests. The highest percentage of companies, where the employees are obliged to make the quality tests are concentrated to the group of "new complete adopters" (53%), but we can see that this percentage decreased compare to proposition of improvement of working place for all four categories. Concerning the respect of coded quality norms, this variable is most concentrated in the category of "early complete adopters" if we consider that this category has less observation that "new complete adopters". From the same table we can see that the influence of quality on employees' progress has strong effect concerning four categories, but the strongest effect we can find in the companies under the category "new complete adopters".

This can tell us that "new complete adopters" companies try to find different ways to "make up the lost" concerning the quality. They invest in different department of the quality, but also they involve their employees in improving the quality.

3.2 Dependent variable

We estimate using a logistic model, a polytomic variable over the independent variables that I will present in section 3.3.The dependent polytomic variable constitutes of four categories of ISO 9000 adopters[2].

- The first category of adopters denotes companies that have ISO certification in 1994 (ISO94) or 1997 (ISO97) and have their suppliers also certified (ISOF97) and was therefore called "early *complete certification"*.
- Because I am interested in measuring changes in company's performance before and after certification with ISO 9000 certification, I created a second category that presents companies that have obtained ISO

[2] After initial examination of categories, I realized that there was no company that was ISO certificated in 1994, but not in 1997. However, I soon realized that there is a small group of companies that obtained ISO 9000 certification in 1997, but their suppliers were not certified (197 companies- none weighted). At the moment, I am not interested in this category of companies, so I decided to eliminate this category of companies from my research **(ISO97=1 and ISOF97=0)**.

certification in 1997 (but not in 1994) and their suppliers also have ISO 9000. This kind of adopters of ISO certification I called *"new complete adopters*.

- The third category called *"indirect adopters"* is focused on suppliers that have ISO 9000 certification in 1997, but companies they supply are not certified. I wanted to understand what effect ISO certified suppliers have on company's performance even if a company itself is not certified. Another reason why I chose this category is to see if it is possible that suppliers certified with ISO 9000 have the same influence on quality signaling and improvement of a company as a direct certification does.
- The fourth category named *"non-certified"* presents companies that are not certified in either direct or indirect way, companies that do not have ISO 9000 certification in either 1994 or 1997 and also their suppliers that do not have ISO 9000 certification.

The four categories of the dependent variable are:

Early complete adopters***: ISO94=1 and ISO97=1 and IS0F97=1***

New complete adopters: ***ISO94=0 and ISO97=1 and ISOF97=1***

Indirect adopters***: ISO97=0 and ISOF97=1***

Non adopters***: ISO94=0 and ISO97=0 and ISOF97=0***

3.3 Variables and hypothesis

***A. Investment in quality services*:** There are studies showing that firms that have been working for a longer time with the certified quality systems obtain higher profits than those that have just been certified (Ferguson 1999). There is growing evidence that certain companies who certified earlier with the ISO certification benefit from a 'first move' advantage and also find it easier to differentiate themselves from their competitors.

Moreover, firms that already have the ISO certification increase their possibility to target more customers and to gain a larger market share. The reason for this is that even when the others firms get the ISO certification, the customers' loyalty often prevents them from switching from one firm to other.

The new adopters of ISO certification often decide to introduce ISO certification, usually, following the experience of early adopters. But when they have decided to make this step, they try to "catch up with what has been missed". More precisely, they try to get all advantages concerning of ISO certification, which ISO certified companies already have.

As a result, they invest more in quality of their suppliers, in quality services and external quality services etc.

Therefore we formulate the following hypothesis:

H2: *The new adopters of the ISO certification invest more on quality than the early adopters of the ISO certification.*

To test this hypothesis we created variables relating to an "extra effort" that companies have to make to arrive to a better level of quality: department of quality in 1994 and 1997 (**SQ94 and SQ97**) and external department of quality in 1994 and 1997 (**ESQ94 and ESQ97**). The aim is to compare the effect of these two variables on the early and new adopters of ISO certification.

***B. Number of Previous Adopters within an industry*:** Terlaak and King 1997 suggest that the number of previous adopters impact the probability of subsequent adoption choices. Researchers argue that companies consider previous adopters in deciding whether to adopt the ISO standards.

Interestingly, the effect is even stronger when examining companies in a certain industry or sector. In many industries the ISO certification has already became a basic requirement for doing business. Indeed, competition among the firms will push those without to obtain the certification, especially in certain industries. The companies imitate early adopters of ISO certification, because they want to avoid problems, like for example losing clients.

Consequently, we propose the following hypothesis:

H3: *The greater the percentage of ISO adopters within an industry, the greater the possibility that the percentage will increase in the same industry.*

Here we have used 51 sectors (NAF 114) of different activities. We created the variable SISO94 that presents the percentage of companies that are ISO certificated in 1994 in all of 51 sectors. As such, this will offer a possibility to find out whether companies not ISO certified in 1994 have been "pushed" to become certified within the same sector of activity.

C. Size: Quality is an essential trait for customer satisfaction and competitive success. This is true for companies of all sizes (Anderson, 1999). Unfortunately, resource constraints, including a scarce managerial time, limited training funds, and a lack of quality 'know-how', can place the small-firm manufacturer at a quality disadvantage. As a result, small companies often struggle to achieve the world-class quality standards customers often demand.

- Although evidence suggests that real benefits are available through the ISO 9000 certification, however, most of discussion around the ISO implementation has been focused on large organizations. Very little emphasis has been directed toward the small-firm manufacturer, which is defined as a manufacturer with less than 100 employees (Lee and Palmer 1999). Indeed, it might be questioned whether benefits of the ISO implementation may be the same for firms of all sizes. Moreover, small firms have a significantly more negative attitude towards the certification than medium and large firms.

We therefore hypothesize:

H4*: The larger the size of a company, the greater the possibility that it will adopt the ISO certification.*

To test this hypothesis we created a range of size variables where we used the number of employees in a company to measure the effects the firm's size has on ISO adoption.

The range of company's sizes is as follow:

-20 to 49 employees-**PETITE**

-50-199 employees-**PETITESPMI**

-200 and more employees-**GDE**

Here we wanted to see how ISO certification is accepted in all three size categories of companies, and to determine if it is possible that acceptance of ISO certification increases with an increase in company's size.

D. Export: Companies might view ISO certification as an export requirement, especially if they operate a majority of their business abroad (Terlaak and King 2001). The international marketing aspects of ISO 9000 certification have been regarded as one of the most important reasons to seek certification.

Most authors argue that if companies want to enter a foreign market, they are obliged to have ISO certification. The reason being is that customers are more interested to buy products from foreign producers if they are certified with ISO as it makes them more certain about quality of a producer.

Related to these arguments, we shall formulate the following hypothesis:

H1: *The more a company exports abroad, the greater the possibility a company itself has the ISO certification.*

Using EAE database we created the variable EXPORT that we will use in my further research. We calculated the export of companies and we divided them into four categories according to the percentage of their export.

-export<=3%

-3 %< export<=8%

-8 %< export<=30%

-30% <export <=100%

The reason we have selected the above categories is that we tried to make sure that each group of companies has around 25% companies of the total number of companies that we worked with.

Furthermore, we tried to check if ISO

certified companies export more goods abroad than non certified companies. We try to underline the function of ISO certification concerning that ISO certification has possibility to signal a quality what will permit a company to export more in foreign marketplace.

4. DISCUSSION OF THE RESULTS

In the following section we will present and discuss the results in regards to the four hypotheses and the explicative variables that were tested using the SAS program. Logit estimation results are presented in Tables 4 and 4a. As mentioned above, we tested polytomic dependent variable that consists of four different categories: early complete adopters, new complete adopters, indirect adopters and no adopters with the independent variables.

	Early complete Adopters	New complete Adopters	Indirect Adopters
Intercept	-6.2715***	-4.9202***	-2.6366***
	Size of the company		
20 to 50 employees	ref	ref	ref
50 to 199 employees	0.7702***	0.6376***	0.1860*
200 employees and more	1.6196***	1.6367***	0.4654***
	Features of the company's strategy*		
New products	-0.0258	0.14595	0.2229**
Diversification	0.0661	0.0793	0.0577
Quality improvement	0.3054**	0.3265**	0.3257***
Cost reduction	0.0671	0.1232	0.0722
New procedure	0.1141	0.3483***	0.0193
	External market's constraints		
Concurrence pressure-yes	0.2953**	0.1891	0.2839**
Uncertainty on the market-yes	-0.2392**	-0.1047	0.0527
Clients conditioned- yes	0.3798***	0.4648***	0.3656***
Suppliers conditioned-yes	0.2653*	0.0987	0.2075*
Reglementation-yes	0.0559	-0.0581	0.0371
Due to restructuring-yes	-0.1906	0.0559	-0.0491
Stockholders conditioned-yes	0.3904***	0.3297**	0.2564**
	Quality services		
Department of quality in 1994	0.3262**	0.4180***	0.00791
External department of quality in 1994	0.8934***	0.9263***	0.3284*
Department of quality in 1997	1.5782***	1.8261***	0.7887***
External department of quality in 1997	-0.2964	1.3796***	0.6214***
	Certification inside the sector		
Certification in the sectors in 1994	12.5381***	8.0151***	3.7185*

Table 4: Determinants of Organizational Changes and Computerization of companies in manufacturing industries and agro-food industry of more than 20 employees

Source: Survey COI merges to the EAE, sample of 711, 1323 and 1008 companies, respectively
Parameter: manufacturing industries and agro-food industry of more than 20 employees (missing value197 companies).
The regression integrates 51 indexes of industries that correspond to NAF 114 (reference: textile industry).
Notes: (*), (**) and (***) indicate parameter significance at the 10, 5 and 1 percent level respectively.
Ref: non adopters (1611 companies)
*Ref: for the category of features of the company's strategy- little and quite important

	Early complete Adopters	New complete Adopters	Indirect Adopters
Intercept	-6.2715***	-4.9202***	-2.6366***
	Annual Survey of Industry		
Mono-regionalist			
Multiregional companies	ref	ref	ref
Enterprise quasi mono regional	-0.4851**	-0.6317***	-0.4180**
Mono regional companies	0.3680*	0.5610***	0.3806**
Companies with unique establishment	0.2148	0.6382***	0.2381
Export / Turnover			
Less then 0.30%	ref	ref	ref
From 0.30% to 6%	0.4542***	0.4117***	0.0717
From 6% to 30%	0.5137***	0.3305**	0.00411
From 30% to 100%	0.6684***	0.4968***	0.1161
Subcontract received/ Turnover			
0	ref	ref	ref
Between 0 and 1	0.1104	0.1621	0.0826
1	0.4467*	0.5362**	0.1809
Subcontract confided /Total Expenditure			
Less then 0.04%	ref	ref	ref
From 0.01% To 0.4%	0.0337	0.2232	0.0513
From 0.4% to 14%	0.2620	0.4145***	0.1870
From 14% to 100%	0.5789***	0.7155***	0.3214**

Table 4a: Determinates of Annual Survey of Industry of companies in manufacturing industries and agro-food industry of more than 20 employees

Source: Survey COI merges to the EAE, database of 711, 1323 and 1008 companies respectively
Parameter: manufacturing industries and agro-food industry of more than 20 employees (missing value197 companies).
The regression integrates 51 indexes of industries that correspond to NAF 114 (reference: textile industry).
Notes: (*), (**) and (***) indicate parameter significance at the 10, 5 and 1 percent level respectively.
Ref: non adopters (1611 companies)

The first hypothesis that the new adopters of ISO certification invest more in quality than earlier adopters is strongly supported by my research. In Table 4 we can see that although the early adopters of ISO certification (in 1994) enjoyed a significant and positive effect in having a service quality department, they do not have any effect on external partners to help them improve their quality in 1997. In contrast, the companies that adopted ISO certification later (in 1997) have positive and significant effects shown on both of the above variables (service quality department and external partners for quality) and the coefficient of estimation is higher as compared to early complete adopters of ISO certification.

Therefore, the new complete adopters of ISO certification invest more in quality, probably to "catch up with what has been missed", and to make sure that they will have high quality production, sending a signal of quality to their customers and improving their market opportunities.

The second hypothesis stating 'the greater the percentage of ISO adopters within one industry, the greater the possibility that this percentage will increase in the same industry' is strongly supported by my results. As we can see from Table 4, the independent variable "*Certification in the sector in 1994*" (SISO94) is significant and positive and it matches my hypothesis. Furthermore, we can see that the companies under the category ' early complete adopters' show stronger effect as compared to the new completely certified companies. We can thus conclude that an increase in the adoption rate within an industry increases pressure on other non-certified companies and therefore it increases their probability of adoption. The pressure that companies receive inside the industry concerning adoption of the ISO 9000 standards is a way for companies to understand the importance of the ISO certification if they are to keep their clients and

target new ones.

We can also see that companies that are not directly certified, but only through their suppliers, the effect is not significant. One explanation for this is that there has not been yet enough pressure on the companies to have complete certification, although that does not imply there will not be any in the recent future. Furthermore, this process of establishing certain quality norms will continue to increase pressure on the companies not just in relation to their suppliers, but also in relation to their business partners.

The third hypothesis states that the inter-relationship between the adoption rate of ISO 9000 certification and company size is strongly significant, especially for the large firms (more than 200 employees), and is positively supported by my results. We can see from Table 4 that for the completely certified companies and the new completely certified companies, as the number of workers increase in the company, the coefficient of the inter-relationship also increases. Therefore the hypothesis that the larger the size of the company, the greater the probability of its adopting ISO 9000 certification, is supported by my results.

Our findings are similar with results of Deloitte & Touche (1993) who found that small companies are unlikely to have a formal cost of quality measurement system in place. This is mainly due to the lack of resources and expertise available within small companies.

Another important point here is that for the companies (and their suppliers) certified in 1997, there is a small reduction of the coefficient level as compared to companies (and their suppliers) certified in 1994. This result is expected as we know that in 1994 it was harder for the larger firms to adopt ISO 9000 certification.

Concerning the companies that are certified indirectly through their suppliers, we can see from Table 4 that the coefficient of inter-relationship is only significant for larger firms, although it is not very high.

Rooney (1993) argues that the ISO 9000 standards are generally designed to address the needs of large organizations with existing systems. Small companies would have to outlay significant amounts of cash in order to comply. This would have a direct impact on cash flow and hence the bottom-line.

Table 4a provides the results of the fourth hypothesis stating that the ISO certified firms export more than non-certified firms. The last hypothesis is strongly supported by the results especially for the companies under the category early complete adopters, but is also true for new completely certified companies. Furthermore, the level of significance of this observation increases with the increase in the percentage of company's exports. For the companies that have a higher level of exports ranging from 30 to 100%, the estimation coefficient t is the highest one.

Interestingly, for new complete adopters, the estimation coefficient of the above observation is higher for companies that export less. The probable explanation for this is that companies who are recent adopters of ISO certification do not yet understand the importance of ISO certification, and probably do not realize that as ISO certificated companies they have a greater ability to export abroad, and attract local buyers.

The category indirect adopter that was not included in my first hypothesis, but is still a very interesting one, is that indirect certification does not assist companies to export abroad. One possible explanation for this is that foreign buyers may not be sure about quality of the company if only its suppliers certify it. Therefore the foreign buyer prefers complete certification of the company.

Relating to this hypothesis, the certified companies will be in measure to respect certain obligation from different unions and so like that enter foreign market easier. So for example, The European Community requires firms that sell safety sensitive products in the European Community to conform to ISO 9000 standards (or alternatively submit regular samples for testing). Thus, while adoption ultimately is voluntary, there might be regulatory pressures that influence a firm's adoption decision (Coole, 1999).
Beside the union's regulation concerning the ISO certification, Anderson suggests another reason why companies seek certification when export abroad. So concerning Anderson managers seek ISO to send a signal of quality

assurance to external parties (Anderson et al, 1999).

5. CONCLUSION

In this paper we have presented the empirical results of the impact of ISO 9000 certification on different companies (four different categories). We have attempted to demonstrate that ISO 9000 certification can present a signal of quality on the market, and also act as a tool to improve quality. Furthermore, when these two characteristics are combined, they open up more market possibilities to companies in their future business.

The first and the second hypotheses were strongly supported by the results, and these relate to the two functions of the ISO 9000 certification. The new adopters of the ISO 9000 certification try to send a signal of quality to the market and also to improve quality, and thereby aim to arrive at the same level of quality as early adopters of the ISO 9000 certification. In the third hypothesis concerning the larger companies that are ISO certified, we can conclude that they have a greater possibility of sending the message on the market about their quality and to improve their quality. The fourth hypothesis that ISO certification will give possibility to companies to export more was strongly supported by the results. We would like to emphasize that even when the ISO 9000 certification sends a signal of quality to foreign market it can indirectly improve the quality business of the company at the same time.

This paper explored the extent to which ISO 9000 certification provides a competitive advantage to companies. All four hypotheses suggest a common conclusion: ISO certification provides a quality signaling effect and also improvement of company's performance. Our results are consistent with and support these hypotheses.

To conclude, the ISO certification is particularly beneficial to companies because it can at the same time offer its two main functions: a communication of quality to the market and an improvement in quality factor.

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