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Relationships of quality management systems certification with business performance. Evidences from Argentina small and medium companies.

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Abstract

Management systems (such as ISO 9000, ISO 14000 or similar) have become worldwide the most commonly accepted series of business standards, and certification to one of these standards is becoming a necessary precondition for a company's survival in the future. Literature review collects different kind of relationships between management systems (MS) and business performance. The purpose of this study is the effectiveness and validity of MS, in explaining key factors in their achievement of business success. This work is original because there is very little evidence about this topic in Argentina. In order to understand the effect of MS implementation on firm performance, management systems certified and non-certified firms were investigated statistically to determine any significant difference between them. The sample has 3767 Argentina small and medium manufacturing companies, and data was collected in 2008. The methodology consists in statistical analysis – using Pearson's chi-squared test ($\chi 2$)- in a set of variables (size; presence in market; organizational structure; employment level; investment; innovation; training; exporting activities). Results evidence, statistically tested, that small and medium companies which have MS implemented and certified have some common characteristics: are larger, have been in market long time, their organizational structure is complex, they have more exporting activities, and they do efforts on investments, innovations & training.

Keywords: management systems; business performance; small and medium companies; Argentina.

1. Introduction

Competitiveness is becoming very aggressive in the last decades. The competition of companies for their dominance in their market has become tougher than the competition on products themselves.

Globalization of markets and increased competition has led to a focus on the satisfaction of customers' needs as a means of obtaining competitive advantage and even ensuring survival. One of the major strategic changes that have occurred in recent years in many organizations striving to satisfy customers' needs is an emphasis on quality and the adoption of a Total Quality Management perspective. In this context, Quality management represents one of the most significant research themes in operations management.

ISO 9000 and similar management systems (MS) have become worldwide the most commonly accepted series of business standards, and certification to one of these standards is becoming a necessary precondition for a company's survival in the future.

The effective deployment of ISO 9000 quality management system has been widely recognized in recent years as a means of building sustainable competitive advantage and thereby enhancing firm performance. ISO 9000 standards are internationally recognized and designed to demonstrate that the supplying organization has achieved a basic level of quality by the formalization and documentation of its quality management system (Koc, 2007).

The literature review shows several studies that analyze the relationships between quality management systems and competitive advantage (Naveh et. al., 2005; Briscoe et. al., 2005), business performance (Hui et. al., 2001; Dick et. al., 2008; Tsiotras et. al., 1996; Zhelyazkov, 2010; Terziovski et. al., 2005; Martínez-Costa et. al., 2007; Han, 2000; Rahman, 2001; Singh, 2007; Tsekouras et. al., 2002; Nair, 2006; Dissanayaka et. al., 2001), operational performance (Feng et. al., 2008; Tzelepis et. al., 2006; Koc, 2007) and financial results & profitability (Dimara et. al., 2004; Heras et al, 2002a; Heras et al, 2002b; Sharma, 2005; Corbett et al., 2005; Corbett et al., 2002; Urbonavicius, 2005).

The papers examined base their findings on several countries or regions such as: United States of America, Euro zone and some European countries (Spain, Greece), Australia and Asia countries. No evidence was found in Latin America or Argentine.

The purpose of this study is the effectiveness and validity of management systems (such as ISO 9000, ISO 14000 or similar), in explaining key factors in their achievement of business success. This work is original because there is very little evidence about this topic in Argentinean small and medium manufacturing companies.

In order to understand the effect of MS implementation on firm performance, management systems certified and non-certified firms were investigated statistically to determine any significant difference between them.

The hypothesis of the study is that "certified companies show better business performance -in the variables selected - than non-certified small and medium business".

Nelson & Sampat (2001) affirm that organizations are represented by a set of skills and routines that guide economic actions. In the routines is where lies the knowledge and skills of companies and their diffusion depend on the institutionalization process that occurs within the companies.

From this perspective, the implementation of any management system, and further the process of implementation and certification of standards, represents changes in routines. This means a major transformation in the organizational culture.

There are diverse determining factors that could explain the competitiveness of companies. The interest of this study is to understand its behavior in the case of firms which have a MS.

In this context, Alvarez & Crespi (2001) explain that there is a relationship between the company's size and the strategies to manage their business, describing that small companies can obtain advantages using production technologies (such as Quality Management Systems) or other flexible strategies.

On the other hand, the characterization of Argentina SMEs (Yoguel et. al., 1998) express that it is highly relevant knowing the accumulate experience they have on business management and how it influence on competitive strategies in medium and long term.

In the same direction, Sisson & Artiles (2001) express the direct relationship between employment evolution and firm performance. This researcher explains that the relation of workers with companies is changing from a traditional view to one more complex, based on three principles: employment, competitiveness and cooperation.,

Another important variable that connects business performance and MS is innovation. Several studies (Prajogo et al, 2001; Perdomo-Ortiz et. al., 2004) affirm that MS impacts positively on the innovation processes within companies. Also, training activities have shown to be a key factor to help to sustain and improve certified MS (Novick, 2002).

Thorn (2005) express that companies which export obtain rates of productivity based on the fact of being involved in global markets, with higher requirements than local markets. This effect is called "learning by exporting". And MS are an excellent organizational device to contribute this learning process.

In this global context, the certification of quality systems is understood as a needed step (but not compulsory) in the way to find excellence and a higher competitiveness (Villavicencio et. al., 2002; Shiba, 1995; Merli, 1994).

2. Methodology

A survey instrument was developed to gather quantitative data. This instrument was designed for a national government program, and researchers didn't participate on its elaboration. In this case, the database was provided for the government and variables for the study were selected from the ones available in the survey instrument.

Based on the research framework, the study focus on the research question that deals with the performance improvement of firms as a result of a quality management systems certification. Therefore the study will examine if there is a significant difference between the MS certified and non-certified firms in relation to the firm performance.

The hypothesis is based on firm performance, but the measure of "performance" is an indirect and complex variable and it is not available on database. In this case, based on the data available, the variables selected from survey form are related to their own resources and capabilities (Barney, 1991), that lead these companies to have a better performance.

The list of variables selected is: a) size; b) presence in market; c) organizational structure; d) employment level; d) investment; e) innovation; f) training; g) exporting activities. Each variable is classified in two or three different categories.

The statistical analysis is based on the Chi-Square test for independence. This test, also called Pearson's Chi-square test, is used to discover if there is a relationship between categorical variables. The analysis consists in the comparison of certificated companies vs. non-certificated ones, according of the group of variables chosen.

3. Description of the sample

The data used in this research belongs to sixth survey of the Programme "Monitoreo Aplicado a la Pequeña y Mediana Empresa" (MAPA PyME). This national government program collected data from 3767 manufacturing small and medium enterprises (SMEs) in Argentina, between October and December 2008.

The sample was selected from National Economic Census of 2005, and the companies surveyed where those in the range of 4 to 250 employees. All industrial sectors are included in the sample and all regions into the country as well. The sample is highly heterogeneous on the typology of industries involved. As shown in Table 1, the sample was represented by the following industries:

Table 1: Industries in the sample

Industry	Quantity of firms	Percentage	Industry	Quantity of firms	Percentage
Manufacturing of wearing apparel; finishing and dyeing of fur	165	4,4	Furniture and related products manufacturing	101	2,7
Tanning and dressing of leather; manufacturing of luggage, saddlery and footwear and parts	292	7,8	Paper and paper products manufacturing	118	3,1
Publishing and printing, reproduction of recorded media	251	6,7	Plastic and rubber products manufacturing	267	7,1
Manufacturing of food and beverages	753	20	Metal products manufacturing, except machinery and equipments	391	10,4
Manufacture of auto parts, motor vehicle parts, trailers and semitrailers	202	5,4	Non-metallic mineral products manufacturing	198	5,3
Manufacturing of machinery and	84	2,2	Textile products manufacturing	174	4,6

electric appliances					
Manufacturing of machinery and equipments	330	8,8	Chemicals and chemical products manufacturing	279	7,4
Metals manufacturing	48	1,3	Other manufacturing activities	114	3

Source: Own preparation

The size of these companies reveals the following distribution: 929 firms have less than 10 employees, 1714 have between 11 and 50 employees, and 1066 have over 50 people. In the sample, there is an average of 19.93 years.

The Table 2 shows the proportion of companies which have implemented a management system and those which don't have one.

Table 2. Companies with Management Systems

Strategies of implementation of Management Systems	Frequency	Percentage
None Management Systems	2998	79,6 %
Implementation of a Management System	769	20,4 %
Total	3767	100,0 %

Source: Own preparation

The first evidence of this study show that a low proportion of manufacturing SMEs in Argentina have a MS certified (20.4%). The Figure 1 presents the different types of MS certified and implemented in the group of 769 companies. There is a high proportion of firms (63%) which have implemented ISO 9000 or similar quality management system, while the rest of certifications are distributed among Environmental Management Systems –such as ISO 14000- (15%) , Safety Management Systems -OHSAS 18001 for example- (11%), or other systems (10%).

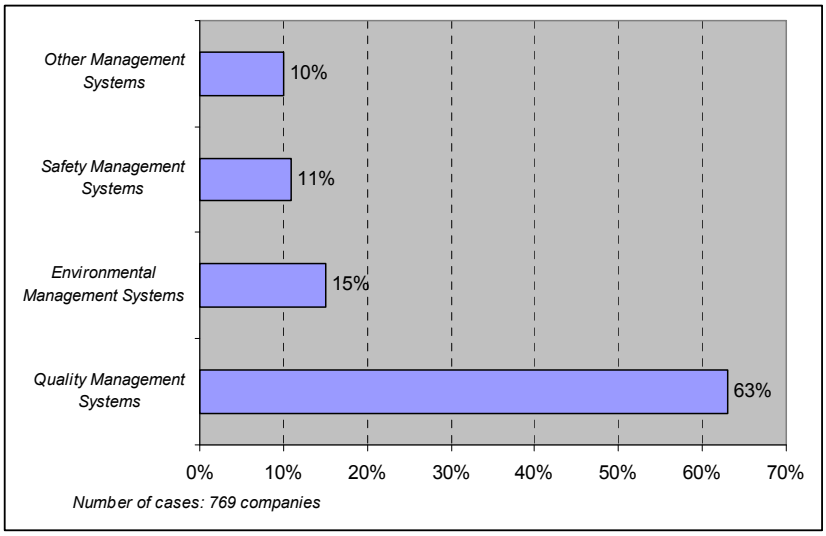

Figure 1: Management Systems certified on sample. Source: Own preparation

4. Results and discussion

In this section, results are presented and discussed. We show the statistical analysis, where certified firms are compared to non-certified companies. The variables chosen for that comparison are detailed in "methodology" section.

4.1. "Size" variable

The data reveals that almost half of the sample (48.4%) with a quality management system belongs to companies which have over 50 employees. This result shows that larger firms tend to implement these

systems than smaller companies. A possible explanation is that, as companies grow, the management needs to become structured and formalized, and MS helps in that way.

On the other hand, very few micro-companies have made efforts to certificate any kind of management systems. The proportion is very low (14.8%). This could be explained on the lack of resources (technical, human and financial) of these firms to get involved in certification process.

Table 3. "Size" variable in certified and non-certified firms.

"Size" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
Micro (less than 10 employees)	817	27,7%	112	14,8%
Small (between 11 and 50 employees)	1435	48,6%	279	36,8%
Medium (more than 50 employees)	699	23,7%	367	48,4%
Total	2951	100%	758	100,0 %

Source: Own preparation
Pearson's chi-squared test ($\chi 2$): 186,694; 2degres of freedom ; 0,000.

As a preliminary conclusion, seen in Table 3, there is statistic significance between the "size" variable and the implementation of MS. So it is possible to affirm that size is a relevant factor in this study.

4.2. "Presence in market" variable

The presence in market is typified in three categories: a) new companies; b) young companies; c) mature firms. As shown in Table 4, the results evidence that firms with more than 15 years have a tendency to implement a MS, because a more than half of the sample (55.7%) of them have. Companies with less than 15 years show low percentages of MS implementation.

Table 4. "Presence in market" variable in certified and non-certified firms.

"Presence in market" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
New companies (less than 5 years old)	531	17,7%	89	11,6%
Young companies (between 5 and 15 years old)	1082	36,1%	251	32,7%
Mature companies (more than 15 years old)	1381	46,1%	428	55,7%
Total	2994	100%	768	100,0 %

Source: Own preparation
Pearson's chi-squared test ($\chi 2$): 27,797(a); 2 degrees of freedom; 0,000.

A possible conclusion of these results is that evolution of firms in markets pushes them to become more efficient and profitable, and there is evidence in many cases, the certification of a MS is a necessary condition to operate in specific markets. And it is common that companies, as they grow, need to formalize their management activities and a MS implementation is very useful.

4.3. "Organizational structure" variable

In the analysis of the organizational structure of the firm, it was asked if the firm has a specific department such as: Engineering, Quality, Design or Research & Development (R+D). This question was standardized in three categories: a) no specific department, b) only one specific department, c) more than one specific department.

The results reveal that 41.5% of the sample with a MS certified has at least two different departments, while 84.6% of the companies surveyed with no MS said they have no specific department. On the other hand, only the 11.4% of firms with no MS, have a structure that includes more than one specific department.

It is possible to deduce that organizations with a MS tend to implement a more complex structure.

Table 5. "Organizational Structure" variable in certified and non-certified firms.

"Organizational Structure" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
No specific department	2536	84,6%	395	51,4%
Only one specific department	121	4,0%	55	7,2%
More than on specific department	341	11,4%	319	41,5%
Total	2998	100%	769	100,0 %

Source: Own preparation
Pearson's chi-squared test (χ2): 416,199(a); 2 degrees of freedom; 0,000.

4.4. Employment evolution

The analysis about employment evolution was tipified in three categories: a) employment rise, b) employment with no changes, c) employment decrease. Table 6 shows that 51.6% of companies with a MS certified have a rise on employment level, while companies with no MS certified have just a 35.1% of the sample with employment rise. On the other hand, a decrease on employment level is higher in non-certified firms (23.8%) than certified ones (19.2%). This analysis was verified statically using Pearson's chi-squared test (χ2).

Table 6 "Employment evolution" Variable in certified and non-certified firms.

"Employment evolution" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
Employment decrease	713	23,8%	148	19,2%
No change at employment	1233	41,1%	224	29,1%
Employment rise	1052	35,1%	397	51,6%
Total	2998	100%	769	100,0 %

Source: Own preparation
Pearson's chi-squared test (χ2): 71,795(a); 2 degrees of freedom; 0,000.

It could be deduced that those companies which have adopted a MS help to have an increase in labor force.

4.5. "Exporting activities" variable

In this analysis, the variable "exporting activities" is categorized in three types: a) no exporting activities in 2007 and 2008; b) exporting activities in 2007 or 2008; c) exporting activities in 2007 and 2008.

The first analysis shows that the quantity of SMEs that have international selling activities is 1547 firms. According to Table 7, 41.1% of the complete sample export products.

The results of comparison analysis are shown in Table 7. A high proportion of firms with no MS certified (64.0%) had no exporting activities, while a 61.0% of the sample which has a MS has had exporting activities in the period of analysis.

Table 7 "Exporting activities" Variable in certified and non-certified firms

"Exporting activities" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
No exporting activities in 2007 & 2008	1920	64,0%	300	39,0%
Exporting activities on 2007 or 2008	930	31,0%	387	50,3%
Exporting activities in 2007 and 2008	148	4,9%	82	10,7%
Total	2998	100%	769	100,0 %

Source: Own preparation
Pearson's chi-squared test (χ2): 163,174(a); 2 degrees of freedom; 0,000.

As it is known, the results can be explained on the need of companies to have a MS certified to sell manufacturing products in international markets.

4.6. "Investment" variable

In this study, it was asked if companies make investments efforts to change technology, adapt production process, develop new products, etc. The variable was classified in three types: a) No investment in 2007 & 2008; b) Investment on 2007 or 2008; c) Investment in 2007 & 2008. No data about amount of investment was informed in the survey.

As shown in Table 8, the data analyzed express that firms with MS have had more investments efforts than non-certified companies, during the period of the study. Almost half of the sample (47.9%) with no MS has done no investments. On the other hand, companies with MS have done investments efforts in 2007 and 2008 (18.2%) is higher than those companies without MS (8.1%).

Table 8 "Investment" Variable in certified and non-certified firms

"Investment" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
No investment in 2007 & 2008	1435	47,9%	268	34,9%
Investment on 2007 or 2008	1321	44,1%	361	46,9%
Investment in 2007 & 2008	242	8,1%	140	18,2%
Total	2998	100%	769	100,0 %

Source: Own preparation
Pearson's chi-squared test ($\chi 2$): 80,042(a); 2 degrees of freedom; 0,000.

4.7. "Training" variable

The "training" variable is typified in two: a) training; b) no training. According to Table 9, a very high proportion of MS certified firms (89.7%) do training activities to the staff. In the group of no certified companies, almost half of them (46.0%) do training activities.

Table 9. "Training" Variable in certified and non-certified firms

"Training" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
No training	1620	54,0%	79	10,3%
Training	1378	46,0%	690	89,7%
Total	2998	100%	769	100,0 %

Source: Own preparation
Pearson's chi-squared test ($\chi 2$): 473,394 (b); 1 degree of freedom; 0,000.

The evidence suggests that MS "forces" companies to plan and execute training activities to all staff.

4.8. "Innovation" variable

The variable "innovation" can focus on new products/services, new process and/or new organizational structure. In this study, the variable was considered only in terms of products. In the survey form, the "innovation" variable was categorized in three types: a) No innovative product in market; b) Only one innovative product in market; c) More than one innovative product in market.

According to Table 10, 64.5% of certified companies have made efforts to introduce new products into markets, while just 31.5% of non-certified firms have produced innovative products.

Table 10. "Innovation" Variable in certified and non-certified firms

"Innovation" Variable	Firms with no management system		Firms with management system	
	Frequency	Percentage	Frequency	Percentage
No innovative product in market	2052	68,4%	273	35,5%
Only one innovative product in market	544	18,1%	313	40,7%
More than one innovative product in market	402	13,4%	183	23,8%
Total	2998	100%	769	100,0 %

Source: Own preparation
Pearson's chi-squared test ($\chi 2$): 287,031 (a); 2degrees of freedom; 0,000.

These results, which have statistical significance, reveal that there is a positive relationship between innovative process and management systems.

5. Discussion of findings

In this study, it was possible to verify statistically, using Pearson's chi-squared test ($\chi 2$), that the small and medium manufacturing companies in Argentina which have implemented MS have better performance than companies without these systems.

The high number of firms involved in the research (3767 cases) assures the relevance and statistical significance of the sample. Each variable and its analysis are presented to validate the conclusions of this exploratory study.

In the case of "firm size", it was found to be a relevant factor. MS certified companies have large size, in terms of employment, than those non-certified firms. A possibility to support this finding is that the MS collaborates companies to grow and so have the resources and skills to survive in market.

The time that companies have been in market has become a critical factor. In general, young companies have a low degree of operations formalization, while MS provides mature firms with an adequate "system" to manage the company.

The results show that companies with MS have a complex organizational structure. The implementation of these systems needs that the firm has a solid and highly interconnected management, to support the activities of business.

There is a positive relationship between MS certified and human resources. MS pushes companies to grow and have a rise in employment level. A possibility to explain is the need of specialized HR to support the complex activities of the management and to contribute to higher production rates.

In the case of investment efforts, SMEs with MS implemented need extra resources to maintain and develop different activities related to the implementation of new or better processes.

Training variable is highly critical, it was verified that training is absolutely needed to help the MS firms to keep the system operating and to work in the continuous improvement of it and company´s activities.

In the case of innovation, the analysis express that MS certified companies have a positive tendency to develop product´s innovations.

Lastly, the exporting activities are correlated to MS firms in this sample. The "learning by exporting" effect could be considered within the management system activities.

6. Conclusions

In this study, it was observed and statistically tested that small and medium companies which have MS implemented and certified have some common characteristics: are larger, have been in market long time, their organizational structure is complex, they have more exporting activities, and they do efforts on investments, innovations & training. We concluded that we could validate our hypothesis.

As a summary, it can be said that the implementation of any of these management systems in SMEs in Argentina is a necessary - but not unique - step to increase competitiveness in global and local markets.

As limitations of this study, researchers suggest that a deeper theory is needed that can incorporate bi-directional influences, because the statistical test used only can explain the existence of a relationship between variables, but there is no evidence about the causal link.

Future research needs to explore, for example, cause and effect analysis, the behavior of these variables in different industries or in different regions within the country. Comparison analysis to other studies can provide further evidence to understand the effect of MS.

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